NETWORK WORLD
The Newsweekly of User Networking Strategies
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Firm unveils SONET-based T-3 switch

By Paul Desmond
Senior Editor

NEW YORK — Adaptive Corp. last week introduced a broadband T-3 switch that will enable users to consolidate T-1 traffic into more cost-effective T-3 facilities and take advantage of emerging high-bandwidth switched services.

The Synchronous Optical Network (SONET) Transmission Manager (STM) Broadband Network Switch, Adaptive's first product, can be used to build a T-3 backbone or, in a stand-alone configuration, to concentrate large amounts of voice, video and data traffic onto T-3 carrier access lines.

Users applaud T-3 switch; firm plans to support HSSI. See stories, pages 87, 88.

It also supports switched T-1 and T-3 services, giving customers the option of using on-demand carrier services to handle peak traffic loads.

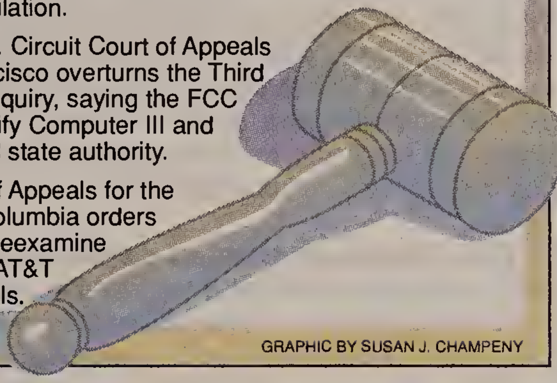
"Think of it as a broadband switch that lets you manage your leased lines and avail yourself of any switched service offerings that carriers have to offer," said Audrey MacLean, chief executive officer at Adaptive.

(continued on page 87)

Setbacks for the FCC

A sampling of major FCC decisions overturned by the courts

June 1986	The U.S. Supreme Court rules that the FCC cannot dictate telephone equipment depreciation methods or rate-making policies for states.
March 1988	The U.S. Circuit Court of Appeals for the District of Columbia orders the reexamination of FCC approval of Shared Network Facilities Agreements between AT&T and BOCs.
July 1989	The Court of Appeals for the District of Columbia orders the FCC to reexamine a ruling on installation and maintenance of inside wiring, saying the FCC failed to justify preemption of state regulation.
June 1990	The 9th U.S. Circuit Court of Appeals in San Francisco overturns the Third Computer Inquiry, saying the FCC failed to justify Computer III and overstepped state authority.
October 1990	The Court of Appeals for the District of Columbia orders the FCC to reexamine approval of AT&T Tariff 12 deals.



GRAPHIC BY SUSAN J. CHAMPENY

Critics claim FCC may be shirking responsibilities

Some say political agenda dictates FCC rulings.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Recent court reversals of major FCC decisions have some industry observers questioning whether the agency is living up to its responsibilities.

Almost 100 Federal Communications Commission decisions are currently pending in federal appeals courts around the country. These cases include decisions in telecommunications, as well as broadcasting, cellular communications and other areas overseen by the commission.

FCC officials point out that the agency handles hundreds of cases that are not challenged and that all federal agencies have some decisions rejected.

But industry observers say they are concerned because some of the commission's biggest decisions are being overturned. They claim that the FCC conducts inadequate investigations and fails to explain its decisions.

Critics also claim that, in some cases, the FCC is driven too much

(continued on page 8)

IBM offers PS/2 as high-end LAN server

Vendor takes wraps off 80486 general-purpose server that may rival superserver performance.

By Tom Smith
Senior Writer

NEW YORK — IBM last week announced the long-awaited 80486-based Personal System/2 Model 95, the company's highest powered general-purpose local-area network server and the platform IBM will enhance to compete with multiprocessor superservers.

Even though the Model 95 currently lacks the multiprocessing capabilities of superservers such as Compaq Computer Corp.'s SystemPro, it may deliver similar performance because the primary processor is the same and the Model 95 uses souped-up Small Computer System Interface (SCSI) disk controllers.

The PS/2 Model 95 XP 486, based on a 32-bit Micro Channel Architecture bus, supports a variety of LAN operating systems, including IBM's LAN Server, Novell, Inc.'s NetWare and Banyan Systems, Inc.'s VINES. The server has six expansion slots for Ethernet and Token-Ring LAN interfaces and can support as many as 128 users.

The Model 95, a floor-standing server, is offered in three versions, two of which are based on a 25-MHz Intel Corp. 80486 microprocessor and the other based on a 33-MHz 80486.

The microprocessor resides on a removable board, which will enable customers to upgrade the 25-MHz versions to 33 MHz and accommodate future enhancements involving new technology.

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Users discuss E-mail privacy. See story, page 4.

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GROUP TO LOOK INTO claims that many CCITT ISDN standards may be incompatible with satellite systems. Page 4.

X.400 GAINS POPULARITY but may not be the right path for everyone. Page 48.

ELECTRICIANS who don't follow procedures may inadvertently slip alligators into your network swamp. Page 91.

NEWSPAPER

FEATURE

ISDN rolls out, but users are still over a barrel

By Daniel Briere
Contributing Editor

After years of testing and marketing hype, Integrated Services Digital Network services are coming into limited use. Nationwide rollout of the services is picking up speed, and some of ISDN's more exciting features are likely to be available before mid-1992.

But even with the expansion of ISDN services, users have found it difficult to translate ISDN's benefits into real dollar savings. So with some notable exceptions, ISDN remains a technology that has been adopted by networking innovators, not general users.

Most current users say they do not expect ISDN to provide magical overnight savings or to cause immediate changes in the network operations at their firms. They see ISDN as

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Five years of SDN shape net industry

By Bob Wallace
Senior Editor

In the five years since it was introduced, AT&T's Software-Defined Network (SDN) service has helped reshape the telecommunications industry by offering users a feature-rich, cost-effective and flexible alternative to private voice networks.

Many of the nation's largest corporations have migrated to SDN and competing offerings because the switched services offer features associated with private nets, lucrative volume discount plans and lower costs per minute than traditional private-line networks.

"Virtual network services forced a fundamental change in the way users viewed voice networks," said Daniel Briere, presi-

(continued on page 86)

Navy to issue its first RFP for GOSIP-compliant gear

Also plans to leverage buying power with other military branches to qualify for larger discounts.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — A top-level telecommunications manager at the Navy last week said the military branch next month will issue its first request for proposal for products and services under the Government Open Systems Interconnection Profile (GOSIP) program.

Speaking at the Government Communications Conference here, Robert Cooney, head of the Telecommunications Support Division at the Navy Regional Data Automation Center, said the contract could be worth as much as $75 million.

Cooney also told attendees that a number of agencies within the Department of Defense are banding together to form a government agency buying consortium that would aggregate purchasing clout to obtain larger discounts on GOSIP equipment and services from suppliers.

Cooney said the Navy's massive GOSIP procurement will call for vendors to supply application-layer gateways for X.400 electronic mail and File Transfer, Access and Management (FTAM) products, which will be installed on the Defense Data Network.

The Navy procurement could be enlarged to supply similar products to the Army, Air Force,

(continued on page 6)

Users vow to pressure FCC to resolve Tariff 12 issues

Several say they will act if the FCC does not.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Tariff 12 users last week said they are prepared to lobby the Federal Communications Commission to resolve any legal uncertainties clouding their custom network deals if the FCC doesn't respond quickly to concerns raised by a federal court.

Users said that, even though they are confident Tariff 12 will be left intact, they are eager to clear up any questions and get on with running their networks. Several users said they are prepared either to file comments when the FCC reopens its investigation or join with others in writing letters supporting Tariff 12.

Late last month, Tariff 12 deals were plunged into legal uncertainty when an appeals court overturned the FCC's decision allowing the discounted custom net deals and ordered the agency to reopen its investigation.

FCC Chairman Alfred Sikes met with several of his top advisers last week, but sources said no definitive decision was reached on how to proceed with Tariff 12.

Paul Singer, manager of communications planning at USAir, Inc., said Tariff 12 customers will urge the FCC to keep the deals in-

(continued on page 6)

CCITT study group readies EDI/X.400 draft standard

By Bob Brown
Senior Editor

GENEVA — By the end of this month, a CCITT study group is expected to approve a draft standard for transferring EDI documents over X.400 links, paving the way for users to consolidate their primary messaging applications onto common network facilities.

Approval of the X.435 document — "Message Handling Systems: EDI Messaging Systems" — as a draft standard would enable vendors to start developing software and value-added net services supporting electronic data interchange over X.400.

Once X.435 is approved as an international draft standard by the study group, it must still be approved by the Consultative Committee on International Telephony and Telegraphy, a process considered little more than a formality.

Users said they are hopeful that X.435, currently a draft recommendation, will be approved as a draft standard for several reasons: a standard method for sending EDI over X.400 links would enable users to send EDI and electronic mail over the same facilities; it would make transferring compound EDI documents easier; and it would save money and simplify net management.

(continued on page 84)

Briefs

GDC to add SONET interface. General DataComm, Inc. (GDC) is expected to announce an agreement this week with an undisclosed supplier of Synchronous Optical Network (SONET) equipment that will enable it to add SONET-compliant interfaces to its Megamux TMS T-3 multiplexer. SONET is an evolving carrier standard for communications over fiber-optic cables at speeds ranging from 51.84M to 622.08M bit/sec.

AT&T/Western Union deal teetering. AT&T's agreement to purchase Western Union Corp.'s Business Services Unit for $180 million expired last week, but AT&T is hanging on, according to an AT&T spokeswoman. Under the deal, which expired Oct. 31, the agreement remains in effect at the discretion of both parties. AT&T said it wants to combine Western Union's electronic messaging businesses, including its EasyLink electronic mail enterprise, with its own global messaging offerings and has formed a new unit to oversee the businesses. The deal has been delayed because Western Union has been unable to win approval from its bondholders on a recapitalization plan.

IBM revamps, refines service focus. IBM last week announced it has realigned its U.S. Marketing and Services organization to better focus on specific service areas such as outsourcing. As part of the reorganization, IBM is phasing out its National Service Division, which previously had overall responsibility for these areas, and forming the Systems Services Division. The new division will address growing customer demand for outsourcing, disaster recovery and other services that enable users to focus on their core business better.

Amex teams up with MCI, US Sprint. Striking back at AT&T's successful new Universal bank credit card, American Express Co. has announced that customers of MCI Communications Corp. and US Sprint Communications Co. will be able to charge calls to their American Express cards. The new service, called Connect Plus, will give MCI and US Sprint customers a 10% discount on all long-distance calls and enable them to charge other phone services to their American Express card while they are away from home. AT&T has become the fifth largest issuer of bank credit cards in the U.S. with 5.8 million cards and 3.6 million accounts.

RBHC manufacturing put off a year. Top congressional aides to Rep. Edward Markey (D-Mass.) and Sen. Ernest Hollings (D-S.C.) told members of the North American Telecommunications Association (NATA) last week during NATA's UNICON '90 20th anniversary convention that legislation to lift the manufacturing restriction on the RBHCs would take center stage in Congress next year. Other issues that both the House and Senate will discuss are the AT&T deregulation proceeding at the FCC, price caps for the local exchange carriers, telemarketing fraud and possibly "slamming," the unauthorized changing of a subscriber's long-distance carrier.

Users banned from Prodigy. Prodigy, a joint venture of IBM and Sears, Roebuck and Co., last week banned at least seven people from its network for protesting electronic mail rate hikes. The users had organized a dissident group that collected 19,000 supporters during the past two months to protest the higher fees. The banning has raised charges of censorship. At issue is whether the network is like the telephone system, where users are free to say whatever they want, or whether the companies that run networks have the right to monitor and control its content.

GSA to chide Medicare agency. Sources within the General Services Administration say the agency is about to issue a report on the Health Care Financing Administration (HCFA) — which mainly keeps track of Medicare expenditures — chiding the HCFA for using IBM's Information Network instead of migrating to AT&T's Federal Telecommunications System 2000 X.25 network.

The migration would require the HCFA to buy IBM's SNA-to-X.25 conversion software — called Network Control Program (NCP) Packet-Switching Interface (NPSI) — or AT&T to put NPSI interfaces onto the X.25 network. GSA favors the former option, while HCFA wants the latter. IBM would profit either way.

The sources say that early next year, GSA is likely to issue a report chiding the Social Security Administration for not moving to Open Systems Interconnection standards.

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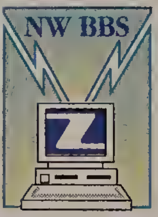

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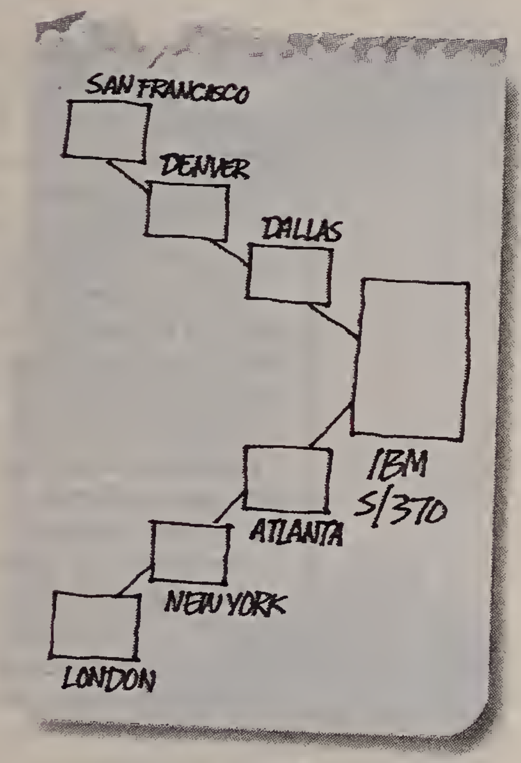

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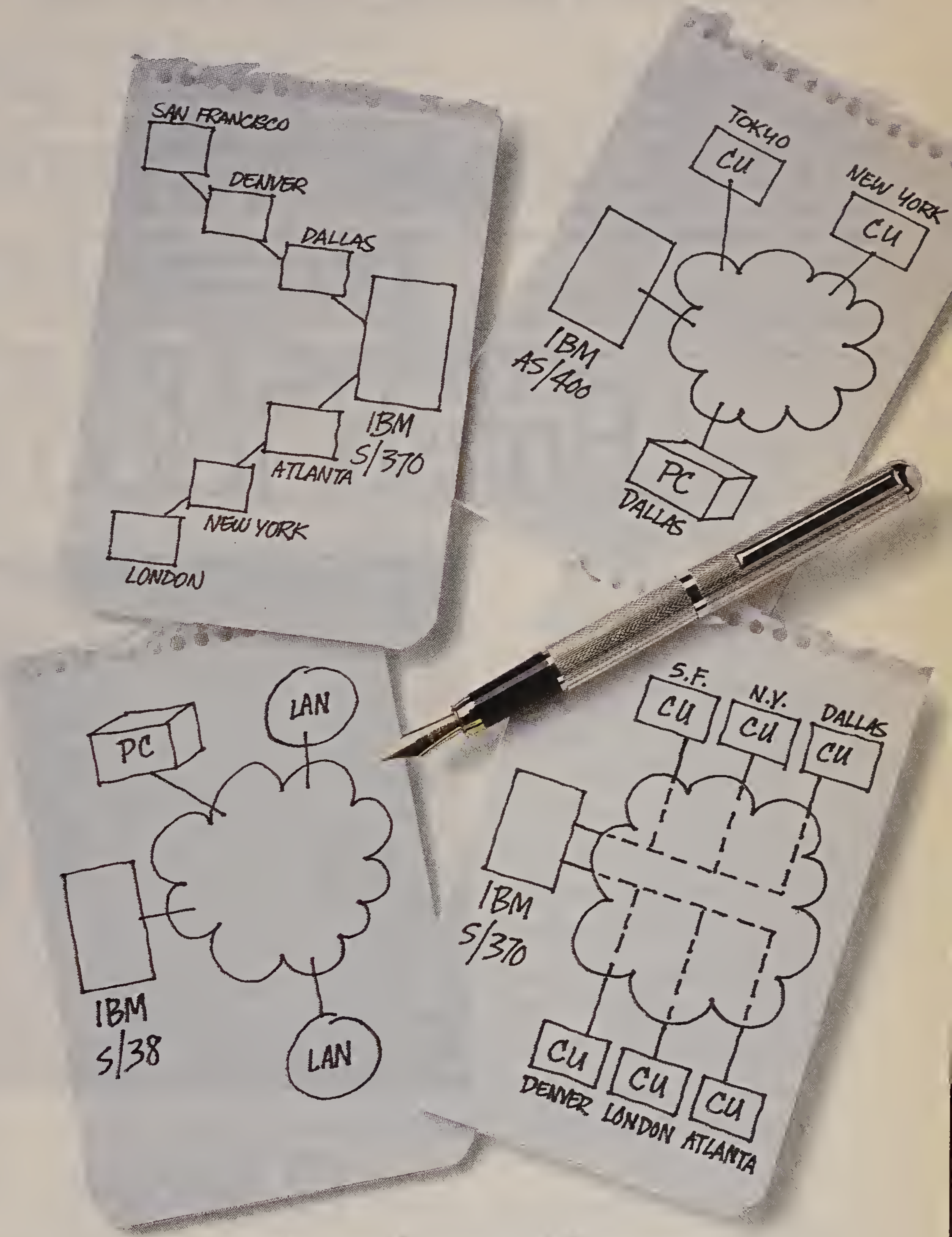

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CCITT to probe ISDN, satellite compatibility

By Barton Crockett
Senior Editor

GENEVA — An international committee is scheduled to begin a formal investigation this week into claims that many existing Integrated Services Digital Network standards are incompatible with satellite facilities.

The ad hoc Consultative Committee on International Telephony and Telegraphy/International Radio Consultative Committee (CCIR) Expert Group on ISDN/Satellite matters is scheduled to meet here to examine claims by the European Telecommunications Satellite Organization (EUTELSAT) and the International Telecommunications Satellite Organization that as much as 20% of all CCITT ISDN standards may be incompatible with satellite systems.

Among other problems, the two organizations have found that existing ISDN standards, if faithfully implemented by manufacturers, could cause throughput of Group IV facsimile transmissions, for example, to be five times slower on satellite ISDN circuits than on terrestrial ISDN circuits. These incompatibilities could be particularly important internationally since satellite is the dominant media used to carry traffic between continents.

"The point is it doesn't work as well as it might," said Ivor Knight, vice-president of business technology and standards at Communications Satellite Corp. in Washington, D.C. and chairman of the ad hoc CCITT/CCIR Expert Group.

Knight said that over the next year, the group will determine exactly where ISDN standards are incompatible with satellite systems and will recommend modifications to appropriate CCITT ISDN standards.

These changes could be implemented by the end of the next CCITT plenary meeting in 1992.

Officials with satellite organizations participating in the CCITT/CCIR Expert Group insist that ISDN can, and does, work over satellite links. The problem, they say, is that standards groups did not pay enough attention to ensuring that ISDN works equally well over both satellite and terrestrial facilities.

An error in error correction

One large potential roadblock concerns the way ISDN standards implement error correction algorithms for packet traffic on ISDN B channels.

For example, most standards for routing packet traffic over ISDN links specify that the receiving device send an acknowledgment back to the sending device about once every eight packets, according to Paolo Amadesi, assistant to the division

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NW user panel takes stand on E-mail privacy

By Maureen Molloy
Staff Writer

Members of *Network World's* User Advisory Panel say companies have the right to monitor electronic messaging systems, but they're divided on whether they should exercise that right.

Panel members said companies should have the authority to oversee use of messaging systems but agreed that a policy of reviewing electronic messages would have a chilling effect on communications within a company. Many said their companies have yet to address this increasingly important privacy issue.

The panel was interviewed amidst the growing controversy over electronic mail privacy — controversy that stems in large measure from a class-action lawsuit filed this summer against Epson America, Inc.

The User Advisory Panel comprises representatives of leading user groups and top network executives from companies in a range of industries.

"A company has the right to monitor E-mail messages if that policy is made clear to all users, though it's bad form for it to actually do [the monitoring]," said Stanley Welland, corporate communications manager at General Electric Co. in Bridgeport, Conn. He said strict oversight could foster resentment among employees and keep them from using messaging systems.

Welland said companies need to update privacy policies to address electronic communications. "Companies must address changes in technology — be it E-mail, fax or voice mail — that make it more difficult for employees to maintain any semblance of privacy," he said.

"A company has an absolute right to query the use of all its resources, and E-mail is one such resource," said Phillip Evans, president of the International Communications Association and telecommunications director at FMC Corp. in Dallas. "Running periodic checks to see that E-

(continued on page 85)

Correction: In the story "New methods help ease net worker shortages" (*NW*, Oct. 29), Dallas should have been listed as the site of Electronic Data Systems Corp.'s headquarters.

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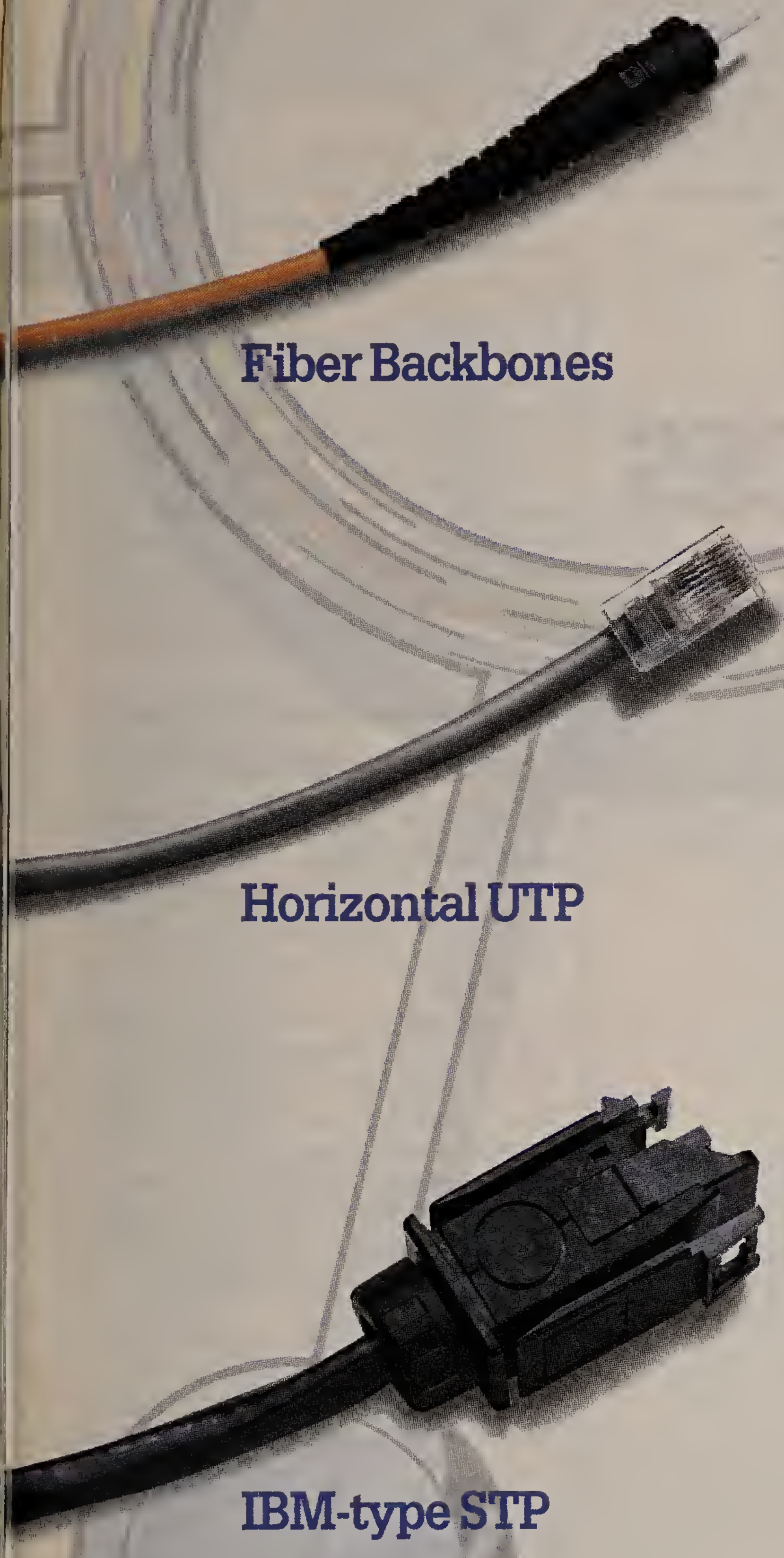

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Navy to issue first RFP for GOSIP gear

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Defense Communications Agency and the Defense Logistics Agency (DLA) as well.

Cooney told attendees that program managers from various military branches are forming the Department of Defense Open Systems Environment, Implementation and Transition (DOIT) Working Group.

DOIT represents an attempt to break through government bureaucracy by allowing one branch of the service to conduct a procurement for all of the branches, which would result in an umbrella contract or bulk purchase agreement in order to supply all the branches with the needed equipment and services at a lower cost than if they negotiated their own deals.

DOIT already has support from the Navy, the Defense Communications Agency and DLA. In the next few weeks, the Army and Air Force are expected to join DOIT by signing a memorandum of agreement that would establish design and acquisition procedures in both communications and computer procurements for all branches of the armed forces.

Cooney noted that if government users make specific requests of vendors, they will probably be answered due to the sheer volume of the orders.

Lt. Cmdr. David Chappell, a communications systems engineer at the Defense Communications Agency, said the Defense Department has specific security needs that would not be easy to satisfy, particularly in tactical mobile data networks used in the field.

Other government agencies last week said they have either already issued GOSIP RFPs or are gearing up to do so.

The National Aeronautics and Space Administration, which is one of the handful of beta sites for Digital Equipment Corp.'s DECnet Phase V, has issued an RFP for X.400 gateway products and X.500 Directory Services, and vendor reponses are expected shortly.

The Department of Veterans Affairs (VA) expects to award a $300 million contract by year end to a vendor that can deliver an integrated X.400/X.500 system under its Nationwide Office Automation for Veterans Affairs procurement.

Walter Houser, policy officer with the VA, said that the agency would judge vendors by emphasizing technical expertise over cost. Technical expertise is important because GOSIP is such a new technology and because the vendor would be required to install the system.

Greg Gage, communications engineer and part of a GOSIP transition team at the Animal and Plant Health Inspection Service of the Department of Agriculture, said that early next month, the agency's Integrated Systems Acquisition Project RFP will ask vendors to supply X.400 gateways, X.500 and a network management component as well.

Key considerations in selection of a vendor would be how well it integrates GOSIP and non-GOSIP products, how well it installs and supports its software, and its overall involvement in the OSI community, Gage said.

At the Department of Energy, which has been mobilized for GOSIP since 1989, Thomas Rowlett, head of GOSIP planning at the Office of IRM Policy, Plans and Oversight, expressed the anxiety of government users in moving from proprietary to open systems. "We've had a lot of problem with the word 'migration,'" he said. "When birds migrate, only about 40% of them make it. We're determined to make it." ◼

Users to pressure FCC to resolve issues

continued from page 2

tact. The message to the FCC will be "users think this is an important thing; it fosters competition and it's good for business," Singer said.

Hank Levine, a telecommunications attorney in Washington, D.C. who has worked with numerous Tariff 12 users, agrees that users will make their voices heard if necessary.

In October 1989, a group of customers successfully mounted a support campaign for Tariff 12 when it appeared that the FCC was poised to require revisions to the deals.

Several major users had personal meetings with Sikes, and a group of 15 AT&T and non-AT&T customers wrote a joint letter urging the agency not to meddle with the tariff.

Stanley Welland, manager of corporate telecommunications at General Electric Co., which was part of the previous user effort, said he would be willing to go to the FCC again to defend Tariff 12.

"My personal reason for supporting Tariff 12 is that it is a very important mechanism for corporate America to control its costs, take advantage of the latest technology and to keep the telecommunications industry in [a] competitive environment," Welland said.

The latest Tariff 12 ruling has created three categories of users, each of which could receive different legal treatment. The first is a group of 60 Tariff 12 deals that were in effect when the ruling was issued, and telecommunications attorneys agree it is extremely unlikely that these will be disrupted by the FCC's investigation.

The second group comprises 14 more deals that had been filed with the FCC but had not taken effect before the ruling. Lastly, there are two deals that have been filed since the ruling. Some say any filings made after the court's ruling may be suspended while the FCC investigates. ◼

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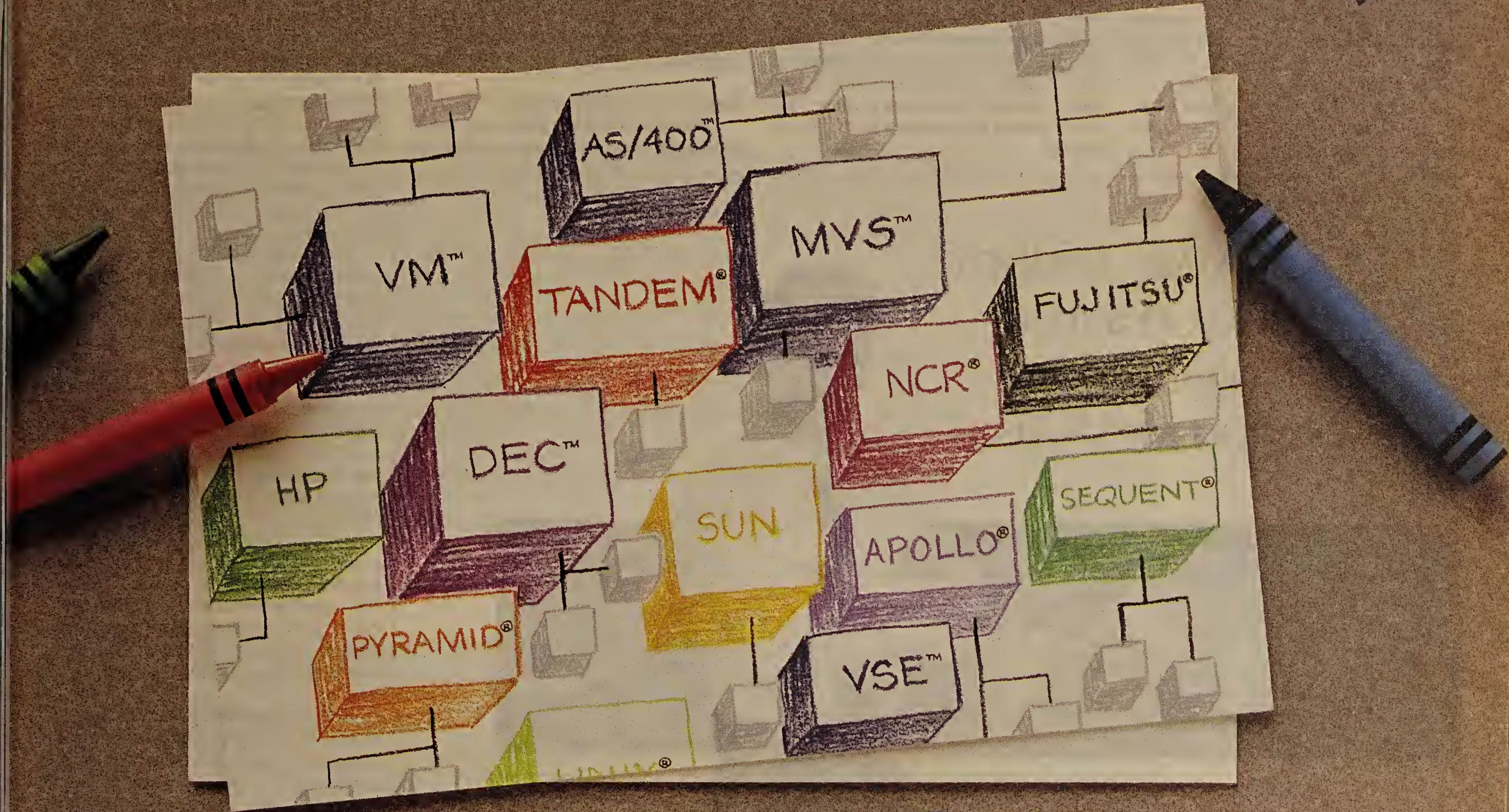

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IBM offers PS/2 as high-end LAN server

continued from page 1

The removable CPU board also houses the system's memory, which ranges from 4M to 32M bytes, as well as an optional 256K bytes of cache memory for improved performance.

The server can support 1.6G bytes of internal SCSI storage in increments of 320M bytes and as many as 9G bytes of external SCSI disk storage housed in new external storage enclosures. Each storage bay can support 2.24G bytes of memory; the PS/2 SCSI controller can support four bays.

The type of disk support offered is one of the areas that differentiates superservers from plain vanilla servers.

Although IBM has supported SCSI on previous PS/2 offerings, the Model 95's high-capacity SCSI will help distinguish it from products such as Compaq's SystemPro superserver. The SystemPro supports 1.68G bytes of internal disk array storage and 2.68G bytes of external Enhanced Small Device Interface memory.

"Disk array technology has traditionally held a performance advantage over SCSI, but IBM has put a lot of intelligence in the SCSI adapters so they should narrow the gap," according to John McCarthy, director of professional systems research at Forrester Research, Inc. in Cambridge, Mass. Compaq's technique is also proprietary. "The user has to buy all their disks from Compaq at a premium price," he explained.

Disk system options can be an important factor in user purchasing decisions. Robert Beckley, director of technology planning at Brigham and Women's Hospital in Boston, said SCSI support makes the Model 95 attractive because "we can get much larger drives than IBM offers at much more attractive prices than IBM offers."

The hospital, which is migrating its information systems from a Data General Corp. minicomputer platform to a client/server LAN environment that may eventually support as many as 100 servers, said it plans to purchase nine of the Model 95s for evaluation.

Single- vs. multiprocessor

Although the single-processor Model 95 lacks multiple processors — which are sometimes considered a requirement for superservers — it should offer comparable performance to superservers because the current generation of software is not optimized for multiple processors.

"IBM doesn't have the sexy multiprocessing, but that's virtually useless, given that there's no software to take advantage of that today, particularly in a file server where the CPU is not the bottleneck," McCarthy said. Disk and I/O constraints are the bottlenecks in a file server, not the CPU, he said.

IBM said it would announce the components necessary to upgrade the Model 95 to a superserver in the first half of 1991. The company has already demonstrated a prototype multiprocessing version of the Model 95 at trade shows. That demo featured an Intel Corp. 80486-based machine with an 80486 coprocessor and an enhanced version of LAN Server that supports multiprocessing.

The 33-MHz Model 95 with a 320M-byte fixed disk costs $17,745, while the 25-MHz Model 95 with a 320M-byte fixed disk costs $16,095, and the 25-MHz Model 95 with a 160M-byte fixed disk costs $14,145. A single SCSI storage enclosure costs $6,500.

Last week's announcement also included a slimmed-down version of OS/2 that fulfills a promise IBM and Microsoft Corp. made last year to offer a version of OS/2 that required less memory ("IBM, Microsoft plot cohesive LAN plan," *NW,* Nov. 20, 1989).

Version 1.3 of OS/2 Standard Edition, announced last week, can be squeezed into less than 2M bytes of memory with two OS/2 applications and a single DOS application, provided those applications are not memory-intensive. Version 1.3 of OS/2 Extended Edition 1.3 requires 3M bytes of memory.

IBM also enhanced its LAN Server, primarily through upgrades to the base OS/2 operating system. For example, it has a new feature that allows multiple LAN users to share server-attached asynchronous communications devices such as modems.

OS/2 Standard Edition 1.3 costs $340, while Extended Edition 1.3 costs $830; both are expected to be available by year end. LAN Server 1.3, priced at $1,040, should be available by March. ☑

FCC may be shirking responsibilities

continued from page 1

by ideology and disregards evidence that fails to support FCC officials' viewpoints. Still, others claim that any FCC shortcomings are attributable to inadequate funding, outdated laws and a rapidly changing marketplace.

FCC decisions reversed by the courts cover issues ranging from custom nets and enhanced services to building wiring. But a common thread throughout the reversals is concern over the FCC's handling of the issues. Appeals court judges have sent back a number of cases saying the agency cut corners in its proceedings.

Even when FCC orders are not appealed, vendors and user groups complain about the agency's practices. They claim the FCC drags its feet on major decisions and often brushes off objections to tariffs in one-line statements.

The FCC's current troubles have evolved slowly but have reached the point where its credibility is on the line, some observers say. Although a number of attor-

(continued on page 85)

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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

Interstate T-1 rate declines in the third quarter "underscore the tremendous capacity the major interstate carriers now have in their national networks and their willingness to use price as the primary competitive determinant."

George David
President
CCMI
Ramsey, N.J.

People & Positions

Former 3Com Corp. Executive Vice-President **Leslie Denend** last week was named president and chief executive officer of Vitalink Communications Corp., ending a five-month search to replace **George Archuleta,** who resigned from those posts last summer.

Earlier this year, Denend was one of three employees named by 3Com Chairman William Krause to a management triumvirate responsible for handling the company's daily operations.

Denend and the two others in the group were considered likely candidates to succeed Krause as president and CEO. Eventually, 3Com appointed **Eric Benhamou** to those posts.

As part of a companywide restructuring, 3Com Corp. has appointed **Andy Verhalen,** formerly vice-president and general manager of the Transmission Systems Division, to the position of vice-president and general manager of the newly created Network Adapter Division.

Eric Benhamou, 3Com president and chief executive officer, will head up the new Network Systems Division. 3Com has combined all of its work group and enterprise systems divisions into the new divisions. ◘

Codex downplays frame relay group's significance

Claims standard is clear enough without guidelines.

By Paul Desmond
Senior Editor

MANSFIELD, Mass. — At the introduction of its first frame relay products last month, Codex Corp. said it will back the frame relay specification now supported by more than 20 vendors, but at the same time, the company downplayed the significance of that specification.

Codex said the emerging frame relay standard is straightforward and there is no need for a vendor group to set guidelines for building products that comply with it.

Company executives made it clear that they consider the backing of the specification — originally announced by cisco Systems, Inc., Digital Equipment Corp., Northern Telecom, Inc. and StrataCom, Inc. — as little more than grandstanding by vendors as a way to garner attention for their products.

Backers of the specification claim there is a need for a single implementation document that would ensure product interoperability, given the many options outlined within the frame relay standard. In addition, they claim that the specification offers extensions to the ANSI frame relay standard, covering such issues as specific network management capabilities that will be of value even after the standard is completed.

"I think this consortium of frame relay folks is going to be very short-lived," said John Thibault, senior vice-president of the Codex Product Division. "As soon as the standard comes out, everybody will build toward that. We're following [the group's specification] today because it's the best there is."

The comments from Codex surprised some analysts because of Codex's close relationship with StrataCom, Inc., one of the most outspoken proponents of the specification. Codex resells StrataCom's IPX T-1 multiplexer as the Codex 6290, and Codex parent Motorola, Inc. has a 20% interest in StrataCom.

Codex has been closely involved with the frame relay standardization effort. Gail Smith, principal product manager at Codex, served until August as chairwoman of the ANSI T1S1.1 committee, which is working on a portion of the standard.

(continued on page 13)

INDUSTRY BRIEFS

Sterling reorganization. Sterling Software, Inc. last week announced the creation of a new electronic data interchange group consisting of Sterling's existing Ordernet Services Division and two newly formed divisions: the EDI Labs Division and EDI International Division.

Warner Blow, executive vice-president of Sterling and president of the Applications Software Group, will assume the additional role of president of the EDI Group. The new divisions are intended to help Sterling respond to strong growth in the EDI industry, according to company executives.

The EDI Labs Division will provide technical support for its two companion divisions. It will also be responsible for the development and support of all software products and systems for Sterling's EDI customers. The EDI International Division will head up Sterling's efforts to satisfy the increasingly international needs of its existing customer base and attract new global customers. The division is based in London.

Bell Atlantic consolidates software groups. Bell Atlantic Corp. has announced that on Jan. 1, it will combine its two software companies — Bell Atlantic Knowledge Systems and Technology Concepts, Inc. — into a new company called Bell Atlantic Software Systems. William Miller, former president of CRISP Automation, Inc., a software systems provider in Dublin, Ohio, will head up the new company based in Morgantown, W.Va. It will employ about 200 workers in West Virginia, Massachusetts and New Jersey. The new company will be part of Bell Atlantic's Software and Systems Solutions Group, which includes companies that provide systems integration and health care information management products. ◘

Status of CCS7 tariff filings

Company	Tariff filed	Summary	Status
Ameritech operating companies	Nov. 21, 1989	New access service, Signal Transfer Point, enables customer interconnection with carrier's CCS7 network.	Scheduled to take effect Jan. 5, 1990, but an FCC decision on the tariff was deferred until Nov. 15.
	Oct. 18, 1990	New service provides CCS7 for Feature Group D and terminating Feature Group B. To use the service, customers must subscribe to the Signal Transfer Point service.	Scheduled to take effect Dec. 1.
BellSouth Corp. operating companies	Sept. 14, 1990	Introduces CCS Access Capability, an option available with Switched Access Feature Group D. Service will be initially available in Greensboro, N.C., and Memphis, Tenn.	Scheduled to take effect Oct. 29, but the FCC delayed its final decision on the tariff another 45 days until it could fully review the data.
GTE Telephone Operations companies	Aug. 1, 1990	Introduces CCS7 Network Access Service.	Rejected by the FCC on Oct. 29 because the company failed to comply with the FCC's cost support rules.
Pacific Bell	Feb. 28, 1990	Access service to connect to Pacific Bell's CCS7 network.	Tariff rejected by the FCC on June 28. The FCC said it could not judge the tariff because Pacific Bell did not provide sufficient cost data or information on the line of services to be offered with CCS7.

CCS = Common Channel Signaling
CCS7 = Common Channel Signaling System 7

GRAPHIC BY SUSAN J. CHAMPENY

CCS7 tariffs await judgment from FCC

Carriers' filings for tariffed services sit in limbo until FCC decides how to regulate new offerings.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — A group of proposed tariffs for Common Channel Signaling System 7 (CCS7) services are languishing in regulatory limbo as the Federal Communications Commission reserves final judgment on them until it can agree on a uniform regulatory policy.

As a result, users should not expect any near-term availability of CCS7 services. FCC officials are not even willing to project when they may come to a consensus on how to regulate emerging CCS7 services.

In the past year, the FCC has either rejected or deferred decisions on CCS7 tariffs proposed by three Bell companies — Ameritech, BellSouth Corp. and Pacific Bell — and GTE Telephone Operations (see graphic, this page).

Before approving any CCS7 tariffs, the FCC wants to resolve key questions, such as what cost allocation methods apply, whether a uniform tariffing process is necessary and which CCS7-provided services should be tariffed.

When the FCC establishes a comprehensive regulatory policy, it typically follows a process called rule-making proceedings, in which it opens up its review of an industry or technology for public comment.

But despite pleas from the Ad Hoc Telecommunications Users Committee, the FCC is forgoing rule-making proceedings in favor of thrashing out the issues with regional Bell holding companies and will not solicit general comment from the public in an attempt to speed up the process.

Front burner?

"CCS7 has been a front-burner item," insisted Colleen Boothby, deputy chief of the FCC's Tariff Division. "It's a major improvement in technology."

Despite the FCC's insistence that CCS7 is a top priority, Boothby would not offer any timetable for when the FCC expects to make a decision on the existing tariffs.

CCS7 is important to users because it is the key underpinning for ubiquitous ISDN offerings and other intelligent network capabilities such as 800 data base services and local virtual networks.

In essence, it involves the installation of special packet-switched networks to route call signaling information between carriers' switches. Out-of-band signaling used in CCS7 makes it

(continued on page 13)

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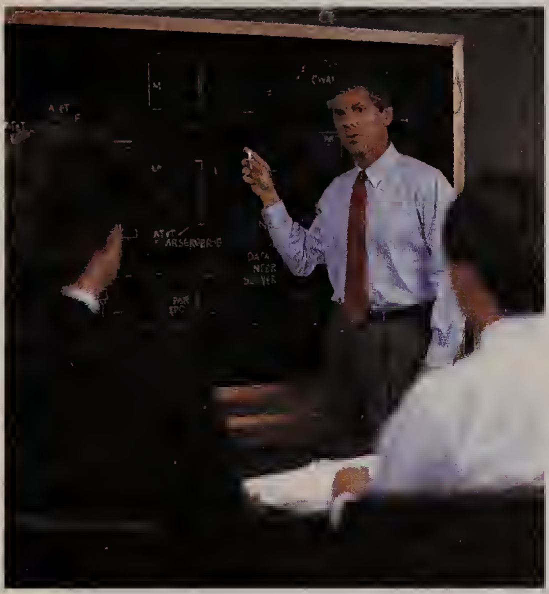

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See us at Comdex (Sands Center, booth N875).

See The FAXNeT Form on Page 85

Postal Service offers to act as X.500 partner

By Bob Brown
Senior Editor

Through rain, snow, sleet and X.500?

That could be the case if a U.S. Postal Service proposal to act as a central administrator for a nationwide X.500 messaging directory is accepted by leading message service providers.

The Postal Service recently made that proposal to the 19 members of the North American Directory Forum (NADF). A consortium of electronic messaging service providers, including AT&T, MCI Communications Corp. and Western Union Corp., the NADF was formed earlier this year to develop a universal messaging directory based on X.500 ("Major E-mail providers plan to form X.500 directory consortium," *NW,* Jan. 29).

The Postal Service proposed to develop and administer a central repository of electronic mail subscriber addresses taken from all of the major electronic messaging service providers. By accessing the central directory, a user on one messaging network could easily send messages to a user on any other network.

For example, a user on Western Union's messaging network would send a query for the address of another Western Union user to Western Union's X.500 directory. The user would send all other queries to the Postal Service, which would send addressing information back to the user.

According to Donald Casey, director of external affairs for Western Union's Business Services unit and a leading NADF proponent, the Postal Service's offer "represents some forward thinking." He said the Postal Service's "expertise in information storage" and its position as a neutral party make its proposal worthy of consideration.

The proposal does have shortcomings, however, Casey said.

Questions about how a query from outside the U.S. would be handled remain unanswered, and there is also concern about investment costs for such a project given that the Postal Service is not an E-mail provider, he said.

Another factor going against the Postal Service proposal is that the NADF was originally formed to create a distributed X.500 directory, Casey said, whereas the Postal Service is pitching centralized deployment.

Industry observers said the Postal Services may be interested in getting into the X.500 directory business so that it does not fall too far behind its overseas counterparts, which have been active in electronic messaging. The Postal Service was unable to comment by press time.

Codex downplays frame relay group

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"The standard is less complex than the V.32 [modem] standards, and no consortium was formed for that," Thibault said.

"But don't forget that there's a lot of V.32s that don't talk to each other," countered Larry Cynar, a senior analyst at Dataquest, Inc., a San Jose, Calif., consultancy. "It's not as simple as they want to make it sound."

Jim Michaels, assistant vice-president of network planning at Newbridge Networks, Inc., which supports the frame relay specification, said there are merits to both arguments.

"There will always be holes [in a standard] that have to be plugged up," he said, which is what the vendors supporting the frame relay specification are trying to do.

Once the frame relay standard is final, he said, he would not be surprised to see the group either dissolve or begin work on other extensions to the standard, such as how to use it to communicate between backbone network nodes as opposed to [communicating] just at the interface to the backbone.

CCS7 tariffs await judgment from FCC

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possible for the switches to query data bases or other switches, capabilities fundamental to advanced services.

CCS7 is widely regarded as an improvement over older signaling methods, which use in-band signaling to transmit information with the voice or data transmission.

CCS7 cost issues

One of the chief issues the FCC is undecided about is how the cost for CCS7 networks will be borne by users at the local level vs. CCS7 costs passed along to users by the interexchange carriers, which also use the services.

"The debate is [over] how much of the cost the interexchange carriers will pick up for use of CCS7," said John Hoffmann, chief of regulatory affairs at US Sprint Communications Co. "Most of the information is in the hands of the local exchange carriers. Long-distance carriers are concerned they could end up subsidizing the costs of building the networks."

While admitting that long-haul carriers will indeed be large CCS7 users, Hoffmann said the long-haul carriers are wary that the local exchange companies may not pay for the percentage of network cost reflecting their actual use.

In order to determine suitable cost allocation tariffs, the FCC wants to know what services CCS7 switched access will sup-

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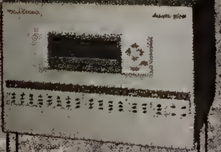

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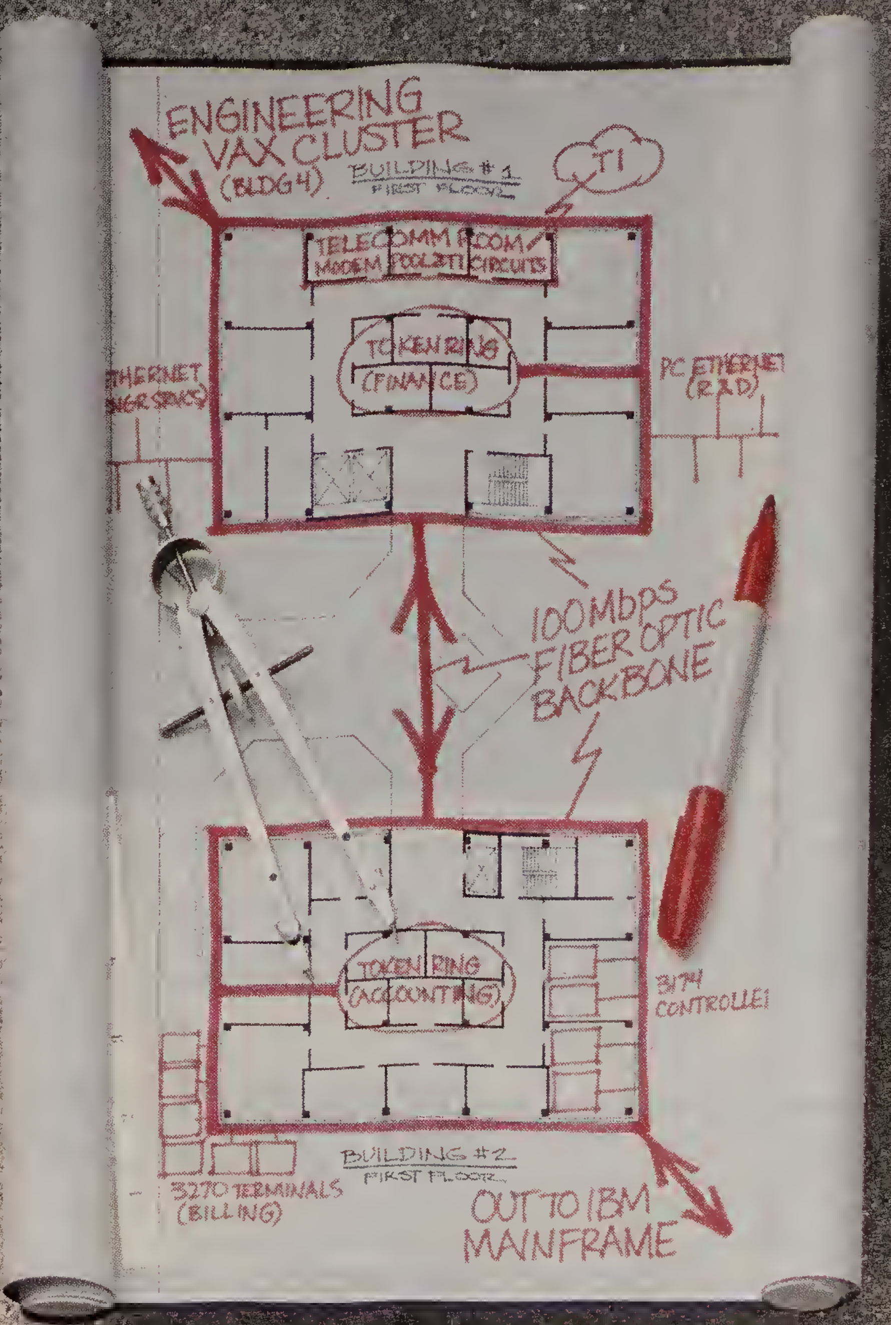

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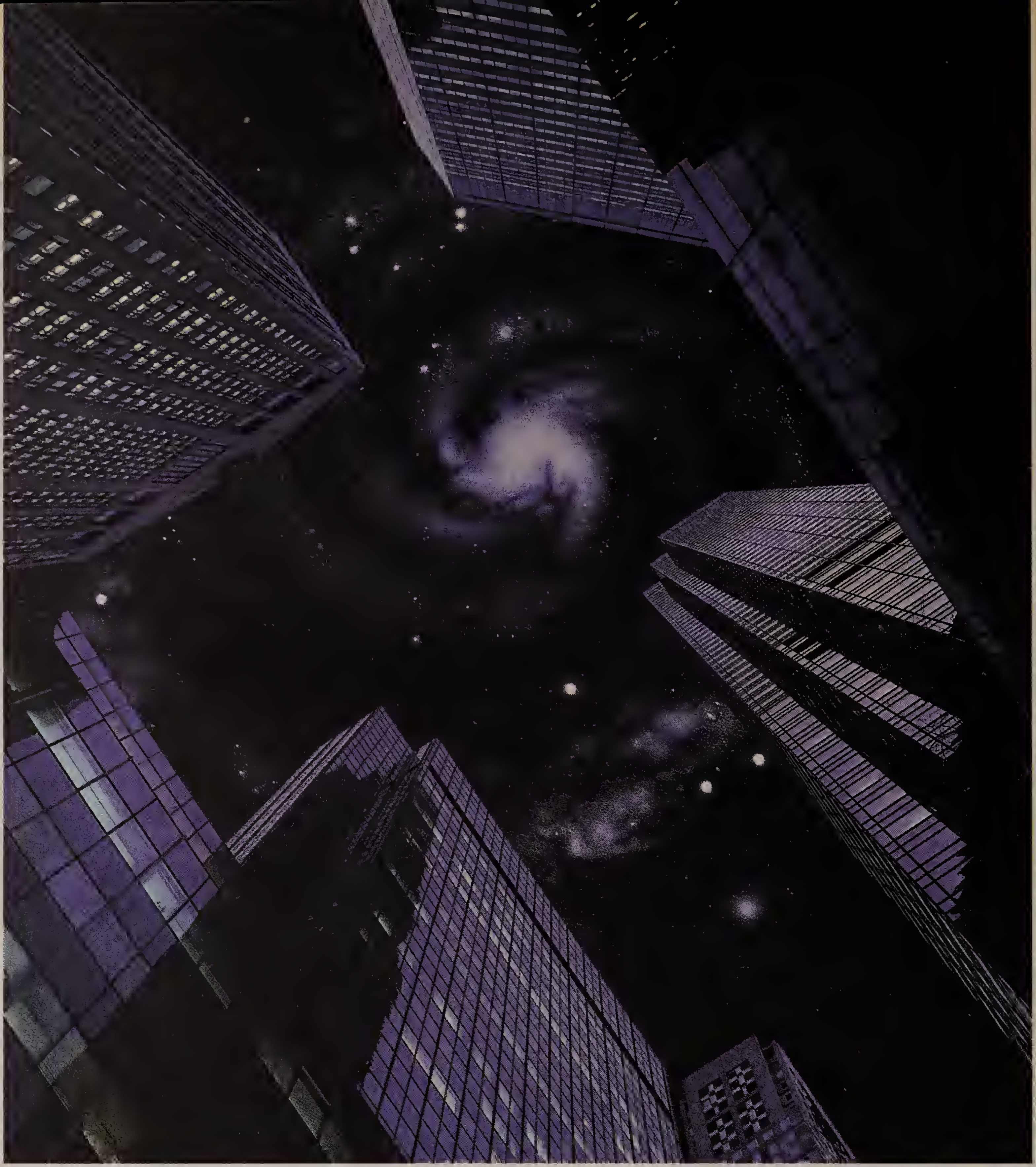

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Worth Noting

AT&T's Enhanced Private-Switched Communication Service (EPSCS) was recently laid to rest after North American Philips Corp., the final EPSCS user, migrated to AT&T's Virtual Telecommunications Network Service Option 51.

Carrier Watch

AT&T recently introduced an option for its 800 and 900 services that enables some of the switches in its networks to perform emergency number translation if the carrier's signaling net is damaged or knocked out of service.

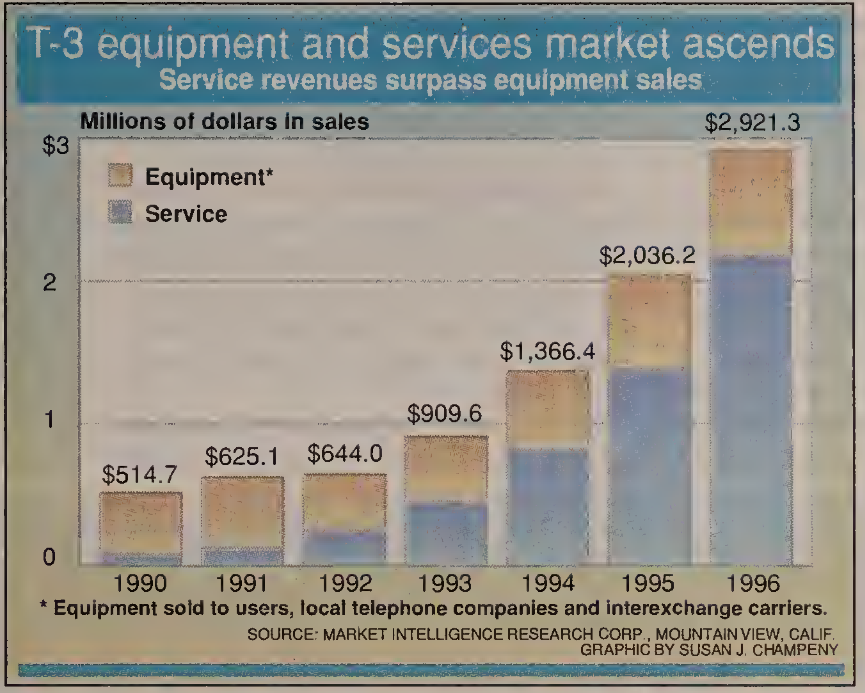
The feature, Alternate Number Translation (ANT), was one of many safeguards AT&T announced for its 800 service in the wake of the Jan. 15 network failure that crippled call centers nationwide. The option is available with AT&T 800 and MultiQuest services.

AT&T's 114 4ESS network switches contain special translation tables used to performing emergency number translation for a limited number of 800 and 900 numbers.

Under typical circumstances, number translation — conversion of the 800 or 900 number dialed to the actual area code and number needed to reach the recipient — is handled by 74 network control points (NCP). If the NCPs are knocked out of service, the 4ESS switches will now be able to take over the translation function.

AT&T is selling storage space in the switch memory on a first come, first served basis. There is a $500 onetime charge for each number entered into the data base, a $500 charge each time the number is changed and a $500 monthly fee for each number in the data base.

ANT is scheduled to be available on Dec. 1.


T-3 equipment and services market ascends

Service revenues surpass equipment sales

* Equipment sold to users, local telephone companies and interexchange carriers.

SOURCE: MARKET INTELLIGENCE RESEARCH CORP., MOUNTAIN VIEW, CALIF.
GRAPHIC BY SUSAN J. CHAMPENEY

FCC won't seek appeal of recent Computer III ruling

Will proceed to reinstate some of its provisions.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The Federal Communications Commission last week decided not to seek a U.S. Supreme Court appeal of a recent ruling overturning the agency's Third Computer Inquiry decision.

Facing a Nov. 2 deadline and internal disagreement about the wisdom of a Supreme Court appeal, the commission decided instead to go forward with proceedings designed to reinstate some provisions of Computer III.

The FCC's Computer III decision laid out a framework for regulating enhanced services, such as data base information retrieval, offered by the regional Bell holding companies. It would have allowed the RBHCs to offer enhanced services through their telephone units rather than separate subsidiaries as soon as they had Open Network Architecture plans in place. This was to ensure that the carriers would not discriminate against rival information service providers.

But in June, a federal district court in San Francisco hearing an appeal of the Computer III ruling said the FCC had not adequately justified its Computer III decision and had overstepped its authority by seeking to regulate enhanced services offered on an intrastate basis.

In a prepared statement last week, Robert Pettit, the FCC's general counsel, said the agency had determined that the Supreme Court would be unlikely to hear the case and that the agency would forgo an appeal. Some industry observers said it was unclear that the FCC would have prevailed even if the court decided to entertain an appeal.

The decision not to appeal was apparently difficult for the commission. At a recent meeting of the Federal Communications Bar Association (FCBA), FCC Commissioner Andrew Barrett said agency officials went back and forth on the issue many times and were still undecided on the matter in late October.

Patchwork of policies

Barrett said the agency was anxious to have the appeals court decision overturned because it could have serious consequences. Because the ruling gives the 50 states and the District of Columbia the right to set their own policies on regulation of enhanced services, Barrett said he is fearful that a patchwork of inconsistent policies will emerge.

> A framework in which every state has different regulations would be fraught with problems.

▲▲▲

"What I don't want to see is 51 plans or 51 guidelines out there," Barrett said.

Many users and vendors agree that a framework in which every state has different regulations for enhanced services would be fraught with problems.

John Lynn, telecommunications counsel with Electronic Data Systems Corp.'s office of government affairs, said it would be a blow to his company if it is

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Single-site company reaps T-1 benefits

Montgomery Securities' seven-node T-1 net is based on multiplexers housed in carrier POPs.

By Paul Desmond
Senior Editor

SAN FRANCISCO — You do not need offices across the country to build a nationwide T-1 network, as Montgomery Securities can attest.

The investment banking firm built a seven-node T-1 net to enable its traders to communicate with clients and other traders in Boston, Chicago, Dallas, Los Angeles and New York, plus a data processing company in Jersey City, N.J.

At each site, except its headquarters here, the company's T-1 multiplexing equipment is located at its long-distance carrier's point of presence (POP), giving the company the cost benefits of a T-1 backbone even though it doesn't have sites at those locations.

The network is run by Tristar Communications, a company Montgomery Securities formed as a separate subsidiary. Besides providing Montgomery Securities with the long-distance services it requires, Tristar sells private-line services to the investment firm's business partners.

Improved reliability

"The basic premise of the whole network was to reduce our costs and improve quality," said Paul Evenson, a vice-president at the firm. "Our reliability has increased tremendously, and when we do have trouble, the repair time is surprisingly quicker. It cuts out a lot of middlemen."

The T-1 net, based on StrataCom, Inc.'s IPX T-1 multiplexers, replaced a slew of point-to-point, analog private lines provided by numerous long-distance carriers, Evenson said.

For each large client or trading firm with which Montgomery Securities did business, it needed a private voice line to support automatic ring-down circuits that would ring at the remote site as soon as a telephone at either end was picked up.

Montgomery Securities pays

(continued on page 16)

WASHINGTON UPDATE

BY ANITA TAFF

Groups push for more price cap data. Claiming that a recent report issued by the Federal Communications Commission on AT&T's performance under price caps is wholly inadequate and flawed, three consumer groups last week stepped up efforts to require AT&T to make more data available in its price cap filings.

The Consumer Federation of America, the International Communications Association (ICA) and the National Association of State Utility Consumer Advocates filed a joint request last week saying that AT&T should have to more clearly show how it calculates pricing indices using the price cap formula.

Although price cap rules require that carriers submit the basic data they use to calculate price cap indices, the three groups said AT&T has been excused from complying.

The FCC has already been asked to review its requirements on AT&T's submission of data, but the three groups say it is necessary to ask for a separate proceeding to look into the matter.

"The failure of AT&T to submit the information seemingly required by the existing rule has made it impossible for interested parties to verify any of AT&T's price cap calculations, even on the most aggregated basis," the group's filing stated.

The ICA and other user representatives have called into question whether AT&T is passing on to its customers all of the savings it has realized from the reduction in access charges during 1989.

The three groups said that asking AT&T to supply the data would help them determine whether users are being protected under price cap regulation and would not require any additional work from AT&T.

Single-site company reaps T-1 benefits

continued from page 15

for the lines because it needs to provide ring-down service to its customers, many of which are located on the East Coast. And customers expect the lines to work at all times.

"If I'm a client and I want to do a trade, I want to do a trade *now,*" Evenson said. If clients don't get a ring immediately, they will likely use a ring-down line to another trader, rather than dial a phone, he said.

Since Montgomery Securities had little control over the analog net, it couldn't guarantee such availability. The analog circuits were also occasionally noisy, which introduced the possibility of a costly error resulting from one party misunderstanding the other.

Cuts costs

The T-1 net, installed between March and December of last year, has solved both problems while reducing overall communications costs by 40%, Evenson said. In addition, Tristar is making a minimal profit and has the potential to grow by selling capacity to more of Montgomery Securities' business associates.

Montgomery Securities' T-1 net is configured in a mesh design with a single StrataCom IPX at each of the six sites and two IPXs here. There are three diverse routes into each city except Boston and Los Angeles, both of which have two diverse routes.

The company uses Communications Transmission, Inc. (CTI) of Austin, Texas, as its long-distance carrier because it "provided the easiest access for our leased-site agreement and provided a diverse and cost-effective network," Evenson said.

Larger carriers — including AT&T, MCI Communications Corp. and US Sprint Communications Co. — were not as willing at the time to allow Montgomery Securities to collocate equipment in their POPs. "More and more, I think you'll see that they're opening themselves up to the idea," he said.

From each CTI POP, full T-1s are handed off to a local exchange carrier. In many cities, including Boston, Chicago, New York and San Francisco, that carrier is a bypass carrier such as Teleport Communications Group or Metropolitan Fiber Systems, Inc. "They provide redundancy in their configurations, and they're very willing to work with you," Evenson said.

The company also uses New York Telephone Co. for some circuits in that city, as well as Southwestern Bell Corp. and Pacific Bell.

In each case, the local exchange carrier takes a T-1 into its digital access and cross-connect system and ships out individual DS0 voice channels to Montgomery Securities clients and business partners.

The local exchange carriers are responsible for maintaining the circuits they provide. "That keeps our maintenance costs down to a minimum," Evenson said. "And with the StrataCom IPXs, we can see what's going on throughout our whole network very clearly and easily."

The IPXs also have the ability to route around failed T-1s so that customers won't notice line failures, he added.

Although the T-1 network primarily supports automatic ring-down circuits, Evenson said it also supports some data and a handful of private branch exchange tie lines for large customers.

The latter lets Montgomery Securities establish a private line between its own PBX and PBXs owned by its largest clients. That obviates the need for those clients to use the public network, thus reducing call setup time from the previous 12 to 16 seconds to three or four seconds.

"Anything like that just increases the willingness of the client to do business with us because it's easier for them to access us in a high-quality fashion," Evenson said.

The T-1 net also supports five 9.6K bit/sec data lines that ship trade confirmation data to ADP, a company in Jersey City, N.J., that ensures that trades between two companies match. Further, the net supports 19.2K and 56K bit/sec data circuits between here and Chicago and New York that are used to transmit stock market data.

MFS rolls out reconfiguration and monitoring management services

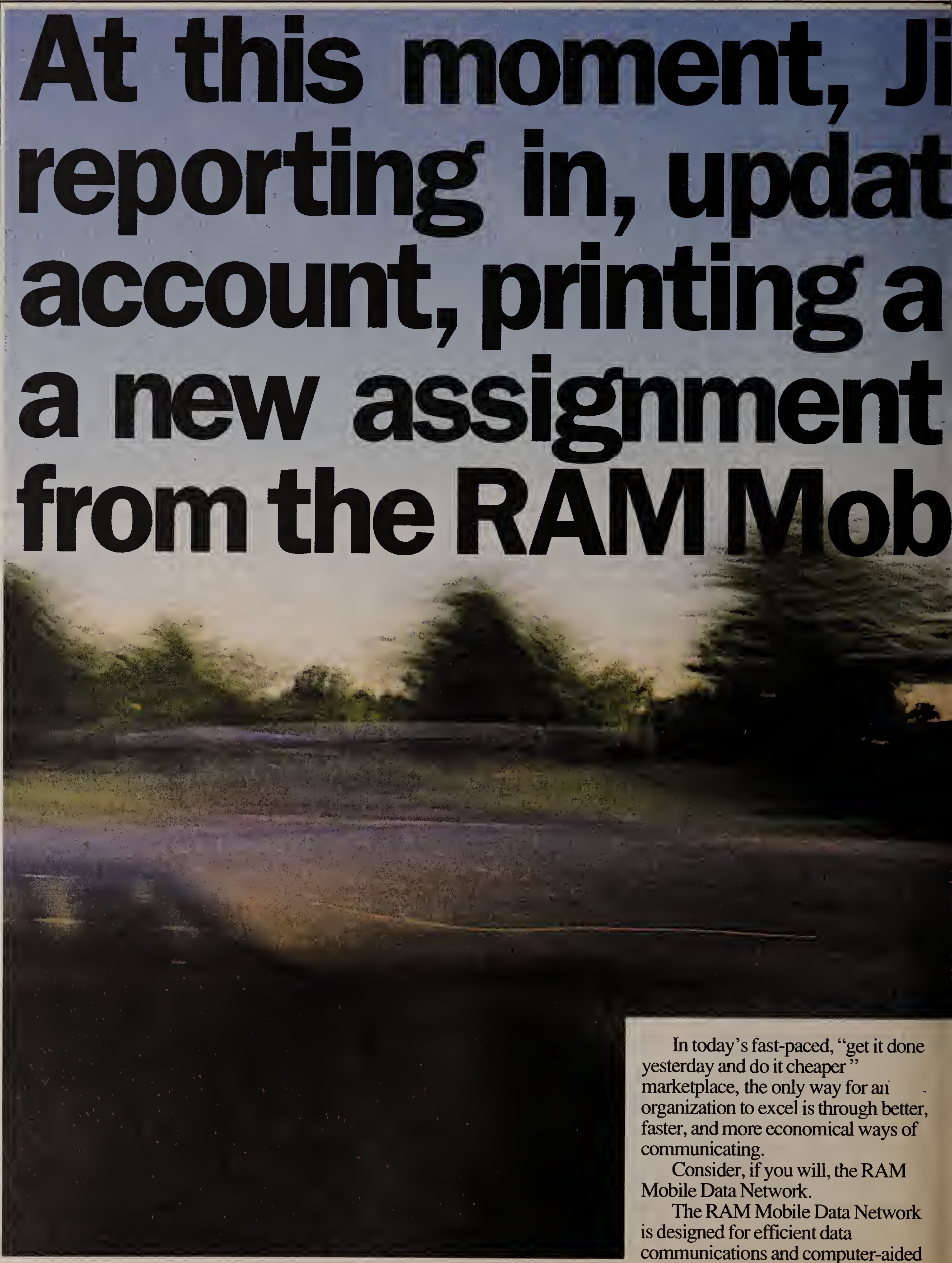
Gives remote on-line access to carrier's net mgmt. system.

By Bob Wallace
Senior Editor

OAKBROOK TERRACE, Ill. — Metropolitan Fiber Systems, Inc. (MFS) recently announced the first in a series of network reconfiguration and monitoring services that will give users remote on-line access to the bypass carrier's network management system.

Developed by MFS for use by its subsidiaries in cities across the country, the MetroFiber Network Reconfiguration and Monitoring Service will enable users to access an MFS host to monitor and reconfigure MFS analog and digital private lines from an on-site personal computer via a dial-up or dedicated link.

Customers also have the option of submitting reconfiguration and test orders by using an MFS 800 number to dial into the carrier's network management center. Reconfigurations are implemented in about



In today's fast-paced, "get it done yesterday and do it cheaper" marketplace, the only way for an organization to excel is through better, faster, and more economical ways of communicating.

Consider, if you will, the RAM Mobile Data Network.

The RAM Mobile Data Network is designed for efficient data communications and computer-aided

30 seconds. MFS customers can use the service to switch traffic from a failed link to an MFS backup line.

MetroFiber Network Reconfiguration and Monitoring Service is available now to companies served by MFS fiber bypass networks in Chicago and New York. The service is scheduled to be offered in a few additional unnamed cities by year end.

MFS users in Boston, Baltimore, Dallas, Houston, Los Angeles, Minneapolis, Philadelphia, Pittsburgh and San Francisco will initially only be able to use the service by calling the 800 number.

Users pay a $4,500 charge, which includes personal computer software and installation, one week of training for one network manager and one month of 24-hour customer support service. ◪

ANI proscription in Pa. affecting ISDN service rollout nationwide

By Daniel Briere
Contributing Editor

Whether you like it or not, you are already being affected by the Bell Telephone Co. of Pennsylvania automatic number identification (ANI) case in which the Bell operating company was ordered to cease providing the telephone numbers of callers to the called party.

For the most part, ANI proponents — carriers and customers alike — have been quick to say the case would have a limited effect on services outside Pennsylvania.

Indeed, a quick survey of managers at interexchange and local exchange carriers offering toll-free products found that the ruling would not stop them from delivering ANI to customers that sign up for their tariffed services, even in Pennsylvania.

But recent discussions with ISDN service product managers around the nation yield a scary observation: The ruling is at least affecting initial rollout plans of ISDN across the nation.

Bell Atlantic Corp., for instance, was stymied in Pennsylvania and now is gun-shy about rolling out ISDN in other states. Maryland is high on the list to receive ISDN, but Virginia will wait because ANI is up for review there. "Why take the chance?" asked Bell Atlantic's ISDN product manager.

"ANI is one of the major applications for ISDN," he continued. "Without it, it may not make sense to go into [Virginia] first. We can wait."

Other managers around the country are saying much the same thing. "ISDN is an investment for the local carriers," said a product manager at one telephone company. "We're not going to take a chance on rolling out service in a state, only to be turned down later for privacy reasons."

ANI is not the only application for ISDN, however. AT&T reports that only 53% of its ISDN users are running ANI-related applications. The rest are taking advantage of call-by-call setup, switched data services, public network user-to-user information transmission and private network backup services. Thus, users in ANI-restricted states may be not get to enjoy non-ANI-related ISDN services due to the significance of ANI to ISDN as a product. ◪

Briere is president of TeleChoice, Inc., a Montclair, N.J., telecommunications consultancy specializing in long-distance service analysis and network design.

FCC won't seek Computer III appeal

continued from page 15

forced to deal with different policies on enhanced services in every state.

"Companies should be concerned about expanding their business, rather than grappling with regulatory issues," he said.

Lynn, who also addressed the FCBA meeting, said he hoped the FCC would seek a Supreme Court appeal.

Success in doubt

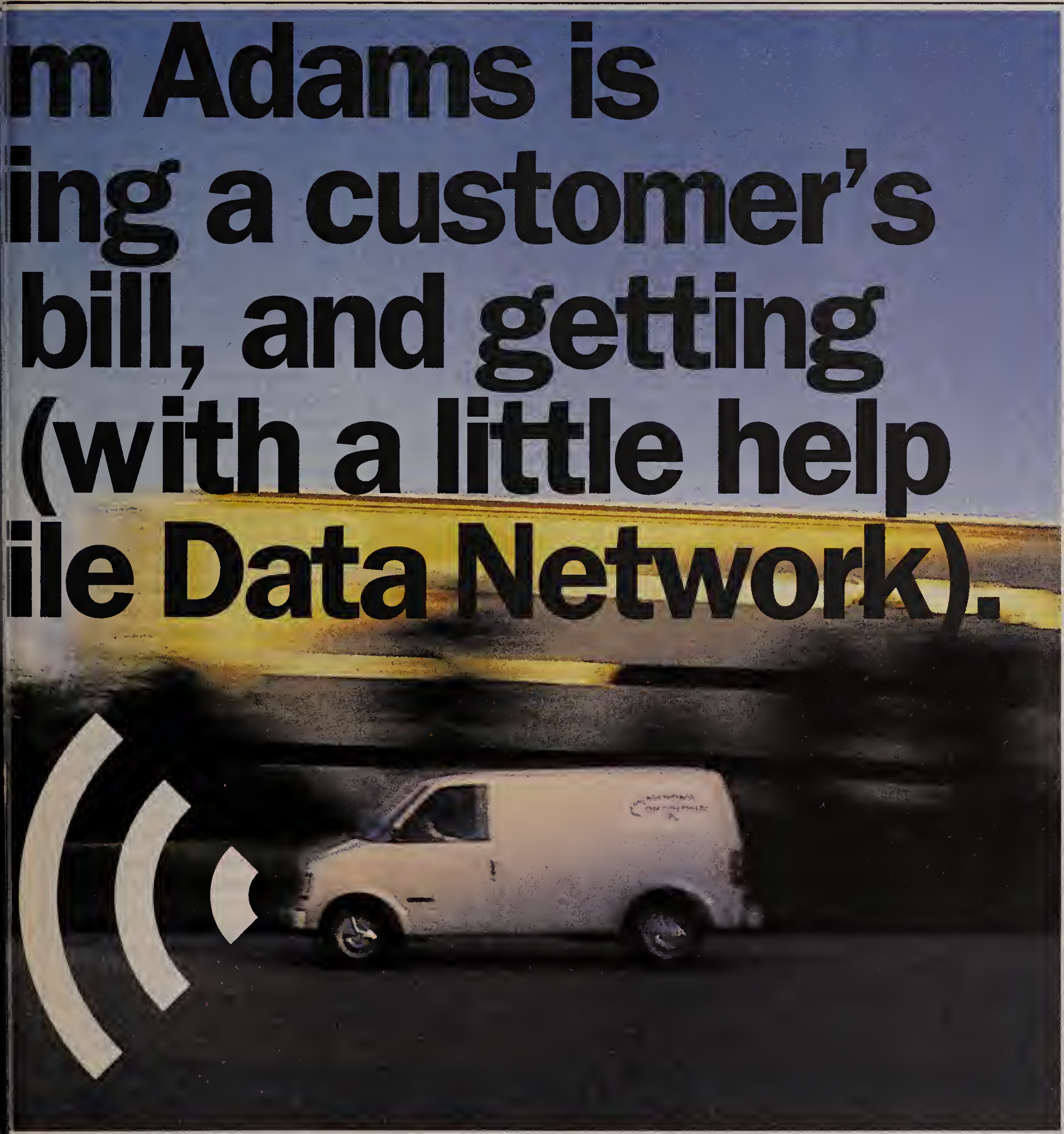
Michael Spevak, an attorney in Southwestern Bell Corp.'s federal relations group, said his company is unhappy with the appeals court ruling but expressed doubt about whether the industry would have benefited from an appeal.

> "I'm not confident you would get much more clarity from [a review] than from going forward with an FCC proceeding," said Spevak, an attorney for Southwestern Bell.
>
> ▲▲▲

The FCC has already opened a new proceeding to collect evidence to justify its Computer III ruling, which Spevak said was a more productive approach.

"I'm not confident you would get much more clarity from [a review] than from going forward with an FCC proceeding," he said.

Spevak also questioned whether the FCC could have won the case. "Even on the aspects [of the ruling] that might be reversible, it's questionable," he said. ◪



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See The FAXNeT Form on Page 85

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General DataComm

See The FAXNeT Form on Page 85

DATA COMMUNICATIONS

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Worth Noting

> "The use of image in the network is going to dominate bandwidth requirements as we go forward through the 1990s."
>
> **Audrey MacLean**
> Chief executive officer
> Adaptive Corp.
> Redwood City, Calif.

Data Packets

Network Systems Corp. is expected to announce next week four more powerful models of its mainframe cross-connect switches.

The switches can be used to connect multiple processors in a data center, provide supercomputers with back-end connections to storage devices and support very high-speed direct workstation connections to mainframes.

All of the switches are compatible with the ANSI High Performance Parallel Interface (HIPPI) standard, which specifies a physical interface that supports 32 data bits in parallel and operates at up to 800M bit/sec.

One of the new switches, the PS8-8, replaces Network Systems' first HIPPI switch, the P8. Like the P8, the PS8-8 supports four full-duplex channel connections. It adds a new feature that lets users reserve a specific output port. Previously, if a requested output port was not available, a request to connect to it was simply rejected.

Network Systems also announced three models of its new PS32 HIPPI Switch, the largest of which supports an aggregate capacity of 25.6G bit/sec. The PS32-108 has eight source and eight destination ports, enabling it to supports four full-duplex connections. The PS32-116 supports eight full-duplex connections, and the PS32-132 supports 16 full-duplex channels.

The PS32s can be upgraded to larger models.

Cray Research, Inc. will

(continued on page 63)

Carrier plans for SMDS

• Deployment schedule •

Ameritech
No firm commitment but plans to trial service in 1991, with general availability likely by late 1992.

Bell Atlantic Corp.
Plans to introduce service in 1991.

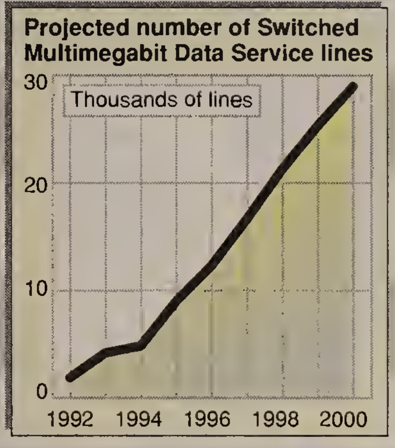
BellSouth Corp.
Plans to trial service in early 1991, with general availability by late 1991.

Nynex Corp.
Plans to have tariffed offering available in large cities by end of 1991.

Pacific Telesis Group
General availability scheduled for late 1991 or first quarter of 1992.

Southwestern Bell Corp.
General availability scheduled for 1992.

US West, Inc.
Plans to offer service in limited areas by fourth quarter of 1991 or first quarter of 1992.



GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: TRANS-FORMATION, INC., TULSA, OKLA.

K mart adds mini to net, improves order processing

Device also cuts credit card authorization costs.

By Bob Brown
Senior Editor

TROY, Mich. — K mart Corp. is reaping a number of benefits from installing a fault-tolerant minicomputer as a transaction processor on its network to handle order processing and routing of credit authorization requests.

The move has helped K mart slash order processing time, more evenly distribute orders to eliminate backlogs and cut credit authorization processing costs.

K mart, a leading discount retailer, recently installed a Stratus Computer, Inc. XA2000 Continuous Processing System Model 220 minicomputer to off-load some processing chores from an IBM 3090 mainframe. The XA2000 is better equipped than the mainframe, which is running aging batch transmission software, to support K mart's growing collection of network applications.

> The move has helped K mart cut credit authorization processing costs.
>
> ▲▲▲

The data center supports K mart's nationwide very small aperture terminal net, which serves more than 2,000 stores housing a total of about 10,000 personal computers ("K mart upgrades national net to fight competitors," *NW*, Feb. 19).

The Stratus XA2000 processes orders from remote sites and passes acknowledgments to an X.25 US Sprint Communications Co. packet switch. That switch then packetizes the data and routes it onto the company's VSAT net.

> The XA2000 passes acknowledgments to an X.25 US Sprint packet switch.
>
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David Carlson, K mart's senior vice-president of corporate information systems, said the benefit of the data center upgrade for the retailer is twofold: better customer service and significantly lower operating costs.

K mart has already moved all of its stores on-line to the improved distribution center order processing application supported by the Stratus XA2000. This application is designed to speed the delivery of merchandise from warehouses to stores by improving order flow, resulting in adequately stocked stores and lower inventory costs. Improved inventory efficiency means that stores can better provide customers with the merchandise they want to buy.

Previously, K mart relied on

(continued on page 22)

OSF/1 unlikely to usurp Unix's hold

Although it has some big vendors backing it, OSF/1 may only be a niche operating system.

By Jim Brown
Senior Editor

The Open Software Foundation (OSF) may have delivered on its promise to build a common Unix operating system for various hardware platforms, but it will be hard-pressed to position its OSF/1 platform as a replacement for existing Unix implementations, analysts said last week.

OSF/1 is more likely to become a niche operating system for running distributed computing applications that will enable one system to transparently tap into other computing resources on a network.

OSF's six sponsor companies all pledged to support OSF/1 when it was introduced ("OSF unwraps long-awaited OSF/1 operating system," *NW,* Oct. 29). However, none said OSF/1 would actually replace their existing Unix implementations (See "OSF/1 support varies by firm," page 20).

Instead, OSF's sponsors — Digital Equipment Corp., Group Bull SA, Hewlett-Packard Co., Hitachi, Ltd., IBM and Siemens Nixdorf Informationssysteme AG — announced intentions to offer various levels of support for OSF/1 in their current Unix implementations. This has led analysts to view OSF/1 as yet another Unix alternative, albeit one that was designed to run across various vendors' hardware platforms.

"I'm not sure whether OSF/1 will be the primary operating system for the HPs, IBMs and DECs of the world or whether it will be relegated to an 'also' on the price list category," said Tom Willmott, vice-president at the Aberdeen Group, a consulting and market research firm in Boston.

Chuck Barney, vice-president and director of competitive analysis at WorkGroup Technologies, Inc., a market research firm in Hampton, N.H., said, "[OSF's sponsors] all have well-engineered versions of Unix that highlight their particular hardware. I think what you're going to see is vendors borrowing bits and pieces of OSF technology for their own operating systems."

(continued on page 20)

Timeplex sells Coastcom mux as part of new line

By Paul Desmond
Senior Editor

WOODCLIFF LAKE, N.J. — Timeplex, Inc. recently announced it will resell a low-end T-1 multiplexer from Coastcom, Inc. as the initial product in a new line of network access products.

Timeplex's new TX1/Access System supports trunks ranging from a single 64K bit/sec line to two T-1s and is compatible with carrier framing formats, making it suitable for hybrid networks that support both private and public network services.

The TX1 is the smallest T-1 multiplexer offered by Timeplex and is the same Coastcom T-1 multiplexer for which rival Network Equipment Technologies, Inc. (NET) last month announced it had signed a licensing and manufacturing agreement.

Strategy kickoff

Timeplex's agreement with Concord, Calif.-based Coastcom is the first of what promises to be a series of agreements through which it will acquire network access products, said Bill Emott, senior product manager for Timeplex.

He said the company is also actively seeking a partner that would supply such products as data service unit/channel service units (DSU/CSU) and modems.

"That strategy is going to roll out during the first two or three quarters of next year," Emott said.

The TX1 gives Timeplex support for interfaces not supported by its previous low-end multiplexers — the microLink and miniLink. Among them is a two-wire voice interface that lets users access carrier-based services such as WATS.

It also supports fractional T-1 services, which Link+ multiplexers can support only when outfitted with a special interface card.

The TX1 can be used to feed voice or data traffic into larger Link+ nodes, to multiplexers

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OSF/1 unlikely to usurp Unix's hold

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The primary OSF technology vendors will borrow is OSF's emerging Distributed Computing Environment (DCE), a set of application development tools due out next year.

With DCE, developers can easily build an application that enables one network node running design analysis software to pass off a computationally intensive task to another computer or several computers on the same network.

The computational servers would perform the necessary calculations and pass the results to the client workstation that made the request, which would then integrate the results with others to complete the analysis.

Analysts say they believe DCE is actually becoming more important to OSF than OSF/1 because users are starting to look for tools to build distributed applications. They are not, however, very keen on the idea of throwing out their existing operating systems in favor of OSF/1.

But one of OSF/1's bright spots is its inherent support for OSF's emerging DCE software tools. Other Unix implementations will have to be retrofitted to support DCE. This means that vendors and users will be able to build distributed applications that run under OSF/1 quicker than waiting until existing Unix-based operating systems are reworked to support DCE tools.

But even this advantage could be lost if some users looking to benefit from distributed computing force their vendors to add support for DCE to existing Unix implementations. It is still unclear how long it will take to add support for DCE to existing Unix implementations.

"Until we see DCE as a product, we are not going to know what is involved in hooking up to it," said Rikki Kirzner, senior industry analyst of Unix service for Dataquest, Inc., a market research firm in San Jose, Calif.

In addition to helping bring distributed computing to the attention of many users, analysts said OSF has done a good job of promoting Motif, its graphical user interface. Many vendors have adopted Motif as a standard user interface for Unix-based applications.

Both Motif and DCE have forced AT&T and Sun Microsystems, Inc. to redouble their efforts to enhance AT&T's Unix System V.4. While OSF's technical developments forced AT&T and Sun to improve Unix System V.4 sooner than they would have otherwise, users are the ones getting caught in a political battle, analysts said.

"What we have here are two organizations trying to out-market each other by saying, 'We're going to have the best thing since canned soup in the second quarter of 1991,' " Aberdeen's Willmott said. "The users I've talked with have been left to ponder the politics rather than the technologies of the situation." ◘

OSF/1 support varies by firm

Although the Open Software Foundation's (OSF) operating system, dubbed OSF/1, made its debut recently, none of the organization's sponsors said they would scrap existing Unix offerings in favor of the new system.

Instead, most major vendors — including OSF's six founding members — are leaning toward keeping the core services of their current Unix versions, and adding system and network services offered within OSF/1 to facilitate application portability.

IBM, for instance, said it will add OSF/1 support to its Unix-based AIX operating system but declined to say when it would debut.

Digital Equipment Corp. said OSF/1 services will be built into the next release of Ultrix, its Unix implementation that is due out next year. DEC also said it will release an OSF/1 application developer's tool kit in the first quarter of 1991. Running on a DECstation, the tool kit will help programmers build applications that run under OSF/1.

Hewlett-Packard Co. said it will introduce a version of OSF/1 for its Precision Architecture Reduced Instruction Set Computer workstations and will add support for OSF/1 to its other operating systems, including MPE, MPE XL and HP-UX, HP's Unix implementation. HP did not announce when OSF/1 support will be available on its workstations or operating systems.

Group Bull SA said it will start working next year to build support for OSF/1 into its GCOS operating system and added that it will adopt OSF/1 as part of its Bull Open Software Environment.

Hitachi, Ltd. plans to build OSF/1 into its mainframe operating systems by the fourth quarter of next year. The firm will later add OSF/1 to its other systems, which range from workstations to powerful supercomputers.

Siemens Nixdorf Informationssysteme AG (SNI), formed by the recent merger of Siemens AG's Data and Information Systems Group and Nixdorf Computer AG, is the only vendor that did not detail its plans for OSF/1. With the merger completed, SNI will begin planning when and how to integrate OSF/1 into its versions of Unix and SINIX.

— Jim Brown

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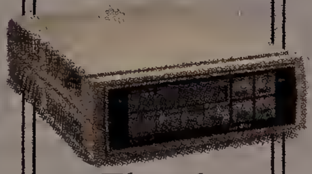

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Timeplex sells Coastcom mux

continued from page 19

from other vendors or to Timeplex's TX3/SuperHub, the company's T-3 switch.

Emott said the TX1 includes its own net management system, although Timeplex is working to support the switch under TimeView/2000, the net management system for the Link+ multiplexer family.

Next on Timeplex's agenda for access products is a 2.048M bit/sec European T-1 interface to the TX1 to address the European market, he said.

Then the company will come out with new products that address users with even smaller bandwidth requirements than what the TX1 currently serves, Emott said. He declined to detail exactly what those products may be.

"At some point, I'm sure there will be a smaller multiplexer product that would orient itself to maybe one or two 64K channels," he explained.

Emott said Timeplex has been talking to Coastcom about the agreement since June and the announcement of the TX1 had nothing to do with NET's announcement of the same multiplexer in September ("NET makes another run at T-1 mart with ADNX line," *NW,* Sept. 17).

The TX1 will be available this month. It comes in eight-, 12- and 24-slot versions and ranges in price from $3,150 for the smallest two-channel configuration to $16,500 for a fully configured model. ◘

K mart adds mini to net

continued from page 19

the IBM mainframe to collect and distribute merchandise orders in batch mode at night.

"[Before], we smashed data across the network at night," said Walt Bzdok, K mart's senior director of corporate communications and systems reliability. "Our nighttime peak demand for batch processing kind of throttles some of our applications and governs our need for transponder capacity on the satellite."

By contrast, the XA2000 continuously receives orders from the stores and directs them to K mart's distribution center during the day. This provides for a more evenly distributed order flow and, therefore, better response time.

"It allows us to carve a day off the time it had been taking us to get orders from a store and into the distribution center," Bzdok said. "The faster we can get orders delivered to the store, the faster we can complete that loop and the less inventory a store needs to carry."

Credit checkup

So far, about 1,000 stores are on-line with K mart's revamped credit authorization network capability.

K mart is using the XA2000 to switch credit card authorization requests from its stores directly to the appropriate credit card company, such as MasterCard International, Inc. or Visa International, Inc.

K mart could have done this with its IBM mainframe, but the XA2000's fault-tolerant capabilities are superior to those of the IBM 3090, Bzdok said.

A Sybase, Inc. SQL/2000 relational data base running on the XA2000 records credit card transactions and provides statistical reports for management, he added.

Previously, stores would route credit authorizations to a preassigned credit card company, such as MasterCard, which has a direct link into K mart's data center. It was then up to MasterCard to either authorize the charge or switch the authorization request to the appropriate credit card or check authorization firm. When MasterCard would switch a request to another authorizer, such as Visa or a check authorization company, K mart would be charged a processing fee by MasterCard.

"When we've got customers all across the country standing at registers waiting for their transactions to be processed, we want to make sure that our system is as fail-safe as possible," Bzdok said.

K mart also plans to off-load the collection and distribution of data from its stores, such as payroll information, to the XA2000 from the IBM 3090 early next year. ◘

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See The FAXNeT Form on Page 85

LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

According to Lotus Development Corp., 43 companies have purchased the Lotus Notes groupware package. More than 10 of those firms have over 200 workstation users. Price Waterhouse is the largest installation, with 10,000 Notes users.

Netnotes

Cabletron Systems, Inc. last week announced SNMP agent software for the WD8000 Ethernet local-area network interface boards from Western Digital Corp.

The Simple Network Management Protocol software will enable the Western Digital boards to be managed from any vendors' SNMP-compliant management station.

Western Digital does not offer an SNMP agent on these interface cards.

The company had announced that it would offer an SNMP agent for 3Com Corp. adapter cards and last week said that it will continue to announce SNMP agent support for third-party LAN interfaces.

The SNMP agent software will be available 60 days after receipt of order and costs $79 per interface card managed.

For more information, contact Cabletron at 35 Industrial Way, Rochester, N.H. 03867, or call (603) 332-9400.

US Sage, Inc. last week unveiled a new Ethernet version of its low-end peer-to-peer MainLAN local-area network for work groups of as many as 12 users. MainLAN consists of a basic network operating system, interface boards and cabling.

The new product, MainLAN Ethernet, supports 802.3 LAN connections at the full 10M bit/sec Ethernet speed.

The product includes US Sage's net operating system as well as eight-bit Industry Standard Architecture interface

(continued on page 25)

Network General adds tools for token-ring monitoring

Vendor enhances Sniffer, offers new Watchdog.

By Tom Smith
Senior Writer

MENLO PARK, Calif. — Network General Corp. last week announced optional software that enables its Sniffer token-ring analyzer to perform monitoring functions and introduced a new version of its Watchdog network monitor for token rings.

The 16/4 Token Ring Sniffer, an analysis and diagnostic tool based on a portable personal computer, can now perform token-ring monitoring through optional Sniffer Token Ring Monitor software.

The Watchdog Token Ring Monitor is a new version of the company's Watchdog Network Monitor, which is designed for Ethernet local-area network monitoring. Both products track activity, utilization and errors.

The products for the first time will enable customers to monitor activity on a 4M or 16M bit/sec token-ring LAN.

Four basic functions are offered under the monitoring capability of the software, including the ability to track the amount of traffic passing through a token ring and the amount of traffic passing from one ring to another through source routing bridges.

Monitoring also involves the capture and display of station and network statistics such as the number of packets transmitted and received. This information can be used to help network managers plan for future net growth.

The third monitoring function provided by the new software is alarm notification, whereby a network manager is alerted to problems such as a nonoperational network node or a bit error rate that exceeds a user-defined threshold. Finally, the monitoring function lets net administrators generate customized tabular or graphical reports summarizing collected data.

The new Sniffer Token Ring Monitor software is available as a free upgrade to users of the 16/4 Token Ring Sniffer, which costs from $12,500 to $24,000, depending on the hardware platform.

The Watchdog Token Ring Monitor costs $2,695. It is offered with personal computer interface cards for Micro Channel Architecture and Industry Standard Architecture buses.

Both products are expected to be available in December. ◪

Accton releases interface, hub for 10BaseT Ethernet

By Tom Smith
Senior Writer

FREMONT, Calif. — Accton Technology Corp. recently unveiled a 12-port 10BaseT Ethernet hub and a high-performance personal computer interface that supports the Ethernet over twisted-pair 10BaseT technology.

The new products are the EtherHub-12R, an active hub, and EtherPair-HPT, a 16-bit board for personal computers based on the Industry Standard Architecture bus and offering performance-enhancing features that make it suitable for use in local-area network servers.

These products complement Accton's existing 10BaseT offerings, which include lower cost and lower performance personal computer interface cards, a transceiver and a laptop adapter.

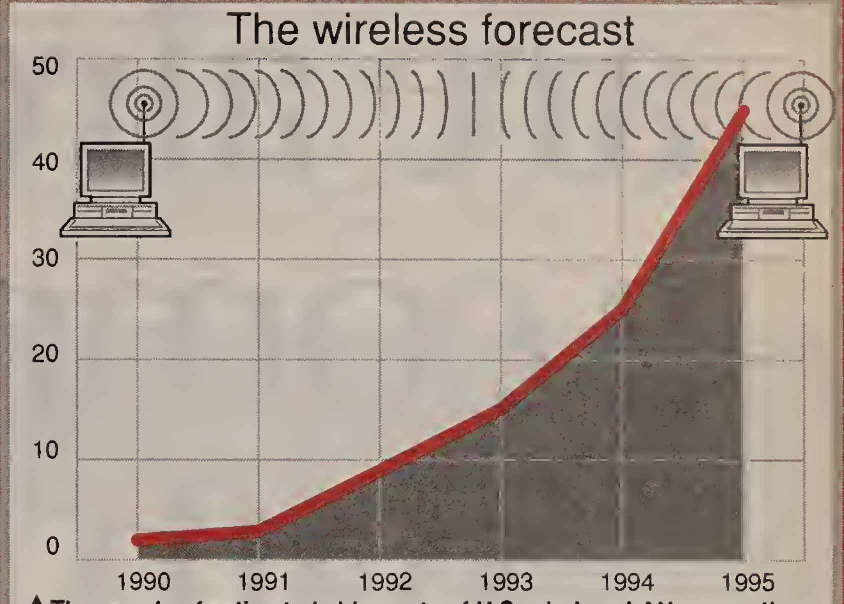
EtherHub-12R is a standalone unit that supports connection of 12 Ethernet nodes at distances of up to 100 meters via unshielded twisted-pair cabling. The hub has an attachment unit interface and BNC connectors so that it may be connected to other hubs or to an Ethernet backbone via thick or thin Ethernet cabling.

Each of the hub's 12 ports has two LEDs: one to indicate link status and the other to indicate a fault that has prompted the hub to isolate the port.

Accton EtherHub-12R is scheduled to ship in December. Final pricing has not been determined, but the company said it will cost less than $1,200.

The EtherPair-HPT's 64K bytes of buffer memory offers better performance than Accton's existing 10BaseT interface cards, which have a maximum of 32K bytes of buffering. The larger buffer makes the interface suitable for file servers or LAN nodes running bandwidth-greedy applications. The interface also has a memory management capability that allows it to allocate the buffers on the card for use in sending and receiving data.

EtherPair-HPT, which costs $399, is available now. ◪



▲Thousands of estimated shipments of U.S. wireless LAN connections

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: FORRESTER RESEARCH, INC., CAMBRIDGE, MASS.

Analysts see limited use of wireless LANs

Although Motorola's new high-speed offering solves one problem, others still stand in the way.

By Tom Smith
Senior Writer

Motorola, Inc.'s recently announced wireless local-area network technology promises to overcome the speed limitation of existing wireless LANs, but analysts say high cost, security and other issues will inhibit general acceptance of the technology.

Two weeks ago, Motorola announced a wireless LAN technology that supports communications at 15M bit/sec. Products based on the technology would compete with other wireless LANs, including a 2M bit/sec product recently introduced by NCR Corp. NCR's product is currently the highest speed wireless LAN on the market.

Although the Motorola and NCR announcements lend credibility to the fledgling market for wireless LANs and Motorola's technical advances overcome one of the largest drawbacks of the technology, analysts said wireless LANs will never really become a serious competitor to cable-based LANs.

Cost drawback

One of the impediments to acceptance of wireless LANs may be the high cost of hardware.

George Colony, president of Forrester Research, Inc., a market research firm in Cambridge, Mass., said he thinks products based on Motorola's technology could cost $1,500 to $2,500 per connection, compared with $500 to $600 for a 10BaseT Ethernet connection, for example. NCR's WaveLAN wireless LAN product costs $1,390 per node.

Perhaps the only wireless LAN that can compete on price with existing LANs is the Local Area Wireless Network (LAWN), a product from O'Neill Communications, Inc. that is based on spread-spectrum technology.

LAWN offers basic file and printer sharing capabilities at 19.2K bit/sec through external transmitters and receivers at a cost of roughly $300 per user, according to Dwight Custer, vice-president of marketing for Princeton, N.J.-based O'Neill Communications.

NCR and Motorola, meanwhile, argue that their technology may save users money in the long run by reducing relocation costs.

One of the impediments to wireless LANs may be the high cost of hardware.

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Vendors and analysts estimate that per-node wiring costs could rise to $2,000, with costs for rewiring a single station estimated to reach $1,000. By most estimates, 20% to 30% of users relocate each year.

"If you look at the cost of rewiring vs. something that's mobile with the worker, it pays for itself," explained John Dunkle, vice-president of Work Group Technologies, Inc., a consulting

(continued on page 25)

Many businesses are already getting a competitive edge with AT&T ISDN.

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If you think Integrated Services Digital Network (ISDN) is just a dream for the future, think again. The advanced technology of AT&T ISDN can give your business a competitive advantage, today.

Did you know, by transmitting voice, data and images all at the same time, over one digital line, AT&T ISDN is already helping many businesses to save money. As well as offering a level of service and efficiency never before possible.

AT&T ISDN is now available in over 300 cities across the country. And here is what it can do for you:

AT&T ISDN is working in Telemarketing:

Even before a telemarketer answers the phone, all account information about the caller can appear on-screen. Telemarketing companies can now give immediate answers to their customers' questions. So orders get processed faster, sales opportunities are greater and customers aren't left on hold listening to music.

AT&T ISDN is working in Transportation:

With AT&T ISDN's Call-by-Call feature, transportation companies are now centralizing control of their dispatch operations and combining various AT&T switched services on the same T-1 pipe. This flexibility means that more calls are being handled with fewer access lines. AT&T ISDN has helped transportation companies save thousands of dollars each month and has moved their businesses into the fast lane.

AT&T ISDN is working in Lodging:

Right now, when their switchboards are all lit up, hotels are using AT&T ISDN to route calls automatically to the next available agent, even if they're in another location. That maximizes their staffing efficiency. Also, with our automatic number identification feature, agents have become more accurate and are saving time, opening the door for more personalized service.

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Limited use of wireless LANs

continued from page 23

firm in Hampton, N.H. "But you're probably looking at a three-year amortization."

Cost is at least one factor that leads analysts to predict that wireless technology will make up only a slight percentage of the LAN market.

"Personal Wireless," a recent report by Forrester Research, predicts that wireless LAN shipments from vendors including Motorola and NCR will increase steadily from 1990 to 1995 but will constitute less than 1% of the total U.S. LAN market by mid-decade (see graphic, page 23).

John Pemberton, program director of communications for field operations at Gartner Group, Inc., a market research and consulting firm in Stamford, Conn., said he agrees with Forrester's market penetration figures. Gartner Group predicts that the U.S. wireless LAN market will total $10 million to $15 million by the end of 1990 and will grow to between $70 million and $75 million by 1995.

Security

Another cause for user skepticism about wireless LANs is security, Pemberton said.

The microwave transmissions used in Motorola's product can be scanned by devices not sitting on the network, making the offering less secure than the spread-spectrum products made by NCR and other vendors of wireless products, including O'Neill Communications.

"Unless you get into spread-spectrum coding or encryption, you're really not at what I'd call secure operation," Pemberton said.

Spread spectrum involves coding data so that only the sending and receiving devices can pick it up. Pemberton argued that the Wireless In-building Network (WIN) scheme used by Motorola restricts which users can send and receive data but does not prevent someone outside the network from scanning the data.

"That's a valid perception and clearly something we have to educate people about," said Rick Lane, senior manager of advanced systems at Motorola's Radio-Telephone Systems Group. Lane argued, however, that since WIN scrambles data and requires the sender and receiver to understand its data structure, the technology is secure.

Dunkle said the security measures provided in Motorola's product could be adequate for the commercial marketplace but are unlikely to meet stringent guidelines set by the government for use in federal agencies.

Despite their concerns, some analysts say there is hope for the wireless LAN market.

"If they can actually come out with all the things they say they'll be able to, I think there's potential for the technology to take off," said Marty Palka, senior industry analyst for local-area networking at Dataquest, Inc. in San Jose, Calif.

Jennifer Pigg, senior analyst at The Yankee Group in Boston, agreed, based on inquiries she has received from users. "But I want to see how much it costs first," she said.

Netnotes

continued from page 23

boards and coaxial cabling.

In the future, the company plans to offer the product for Micro Channel Architecture computers and to support the 10-BaseT standard for Ethernet over unshielded twisted-pair wire.

The workstation shell requires only 30K bytes of memory in a standard DOS computer or 15K bytes in a computer that supports the Extended Memory Specification.

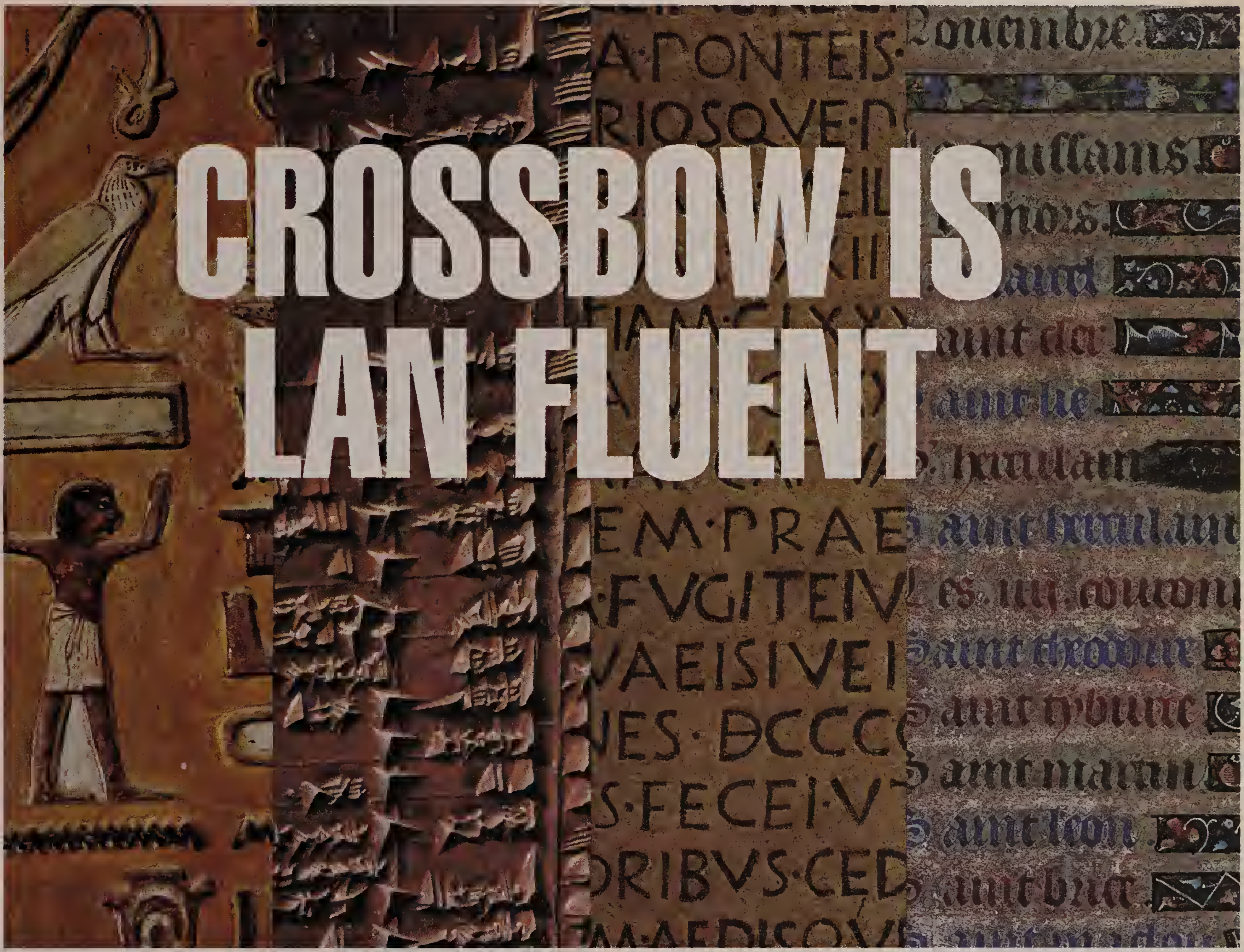
The new interface boards have drivers for Novell, Inc.'s NetWare so users can upgrade from US Sage's operating system to NetWare.

Users can purchase a MainLAN Ethernet starter kit, comprising two interface boards, a network operating system and 16½ feet of coaxial cable, for $499.

Additional Ethernet interface boards can be purchased for $199 each.

The product is currently available.

For more information, contact US Sage at 2005 Fork Tree Lane, Suite 113, Longwood, Fla. 32750, or call (407) 331-4400.



Mixed-protocol environments call for Crossbow, the hub that speaks so many LAN-guages. Like Token Ring at 4 and 16 Mbps. Ethernet, including 10BaseT. AppleTalk. And Apollo Domain.

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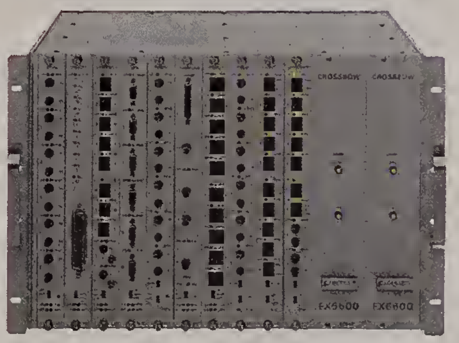

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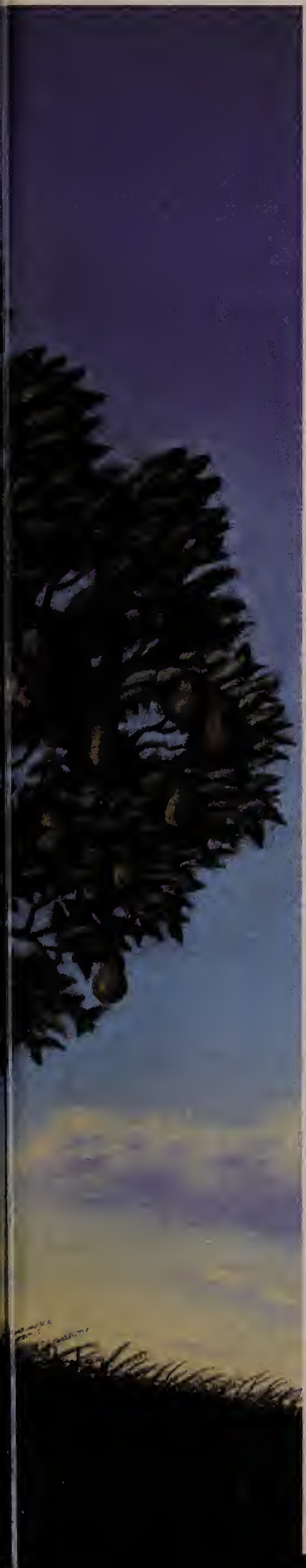

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DEC LAT
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MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USERS GROUPS AND ASSOCIATIONS

Worth Noting

"Every company needs a chief logistics officer who is responsible for looking after all the minor details that go into successful contingency planning.

John Compitello
Vice-president of voice products
and private network services
Goldman, Sachs & Co.
New York

Association Watch

The **Electronic Data Interchange Association (EDIA)** will hold its 22nd National EDI Systems Conference and Exhibit on Dec. 3 to 5 at the Washington Hilton in Washington, D.C.

This year's conference, titled "From Vision to Action in the 1990s," will include presentations by EDI experts from a variety of industries and government, as well as more than 120 exhibits from vendors of EDI products and services. Preconference tutorials are also being offered.

The conference costs $650 for EDIA members and $750 for nonmembers.

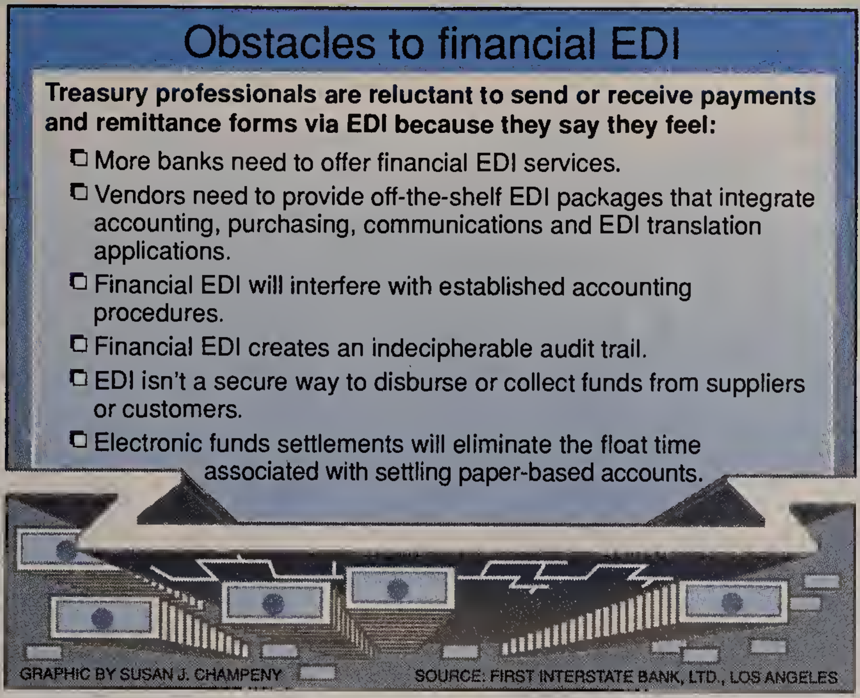
For more information, call (703) 838-8042.

The **Claremont Graduate School** in Claremont, Calif., next May is scheduled to confer its first master's degree in management of telecommunication systems (MTS).

The MTS curriculum requires courses in domestic and international telecommunications policy, as well as classes in information system analysis and design, data communications, accounting and managing technology.

Courses in local-area networks, network management and net performance analysis are offered as electives within the program.

For more information on the program, write to Nancy Back, program coordinator, Claremont Graduate School, 130 E. Ninth St., Claremont, Calif. 91711.



Obstacles to financial EDI

Treasury professionals are reluctant to send or receive payments and remittance forms via EDI because they say they feel:

- ☐ More banks need to offer financial EDI services.
- ☐ Vendors need to provide off-the-shelf EDI packages that integrate accounting, purchasing, communications and EDI translation applications.
- ☐ Financial EDI will interfere with established accounting procedures.
- ☐ Financial EDI creates an indecipherable audit trail.
- ☐ EDI isn't a secure way to disburse or collect funds from suppliers or customers.
- ☐ Electronic funds settlements will eliminate the float time associated with settling paper-based accounts.

GRAPHIC BY SUSAN J. CHAMPENY   SOURCE: FIRST INTERSTATE BANK, LTD., LOS ANGELES

Financial EDI slow to take root in user community

Report cites obstacles to wider implementation.

By Wayne Eckerson
Senior Editor

LOS ANGELES — Demand for financial electronic data interchange products and services remains slack with only the largest U.S. companies showing any commitment to dispersing and collecting payments electronically, according to a recent study.

Many companies are reluctant to use EDI to transfer funds among suppliers and customers because vendors have yet to market software that integrates both accounting and EDI translation capabilities, stated the study conducted by First Interstate Bank, Ltd. here.

Currently, only about 2% of the Fortune 1,000 companies use EDI to transmit payments and remittances, according to Robert Rostorff, EDI product manager at First Interstate and author of the report. In contrast, more than half of all Fortune 1,000 companies currently use EDI to transmit purchase orders, invoices or other documents, and that number is increasing by 20% a year, he said.

"Companies tend to be extremely cautious when it comes to their purse strings," Rostorff said. "Their basic attitude is not to fix what isn't broken.

"Treasury professionals won't implement financial EDI until they're assured it's reliable and cost-efficient and [that] there are off-the-shelf packages that bundle accounting, EDI and communications applications."

The report said software vendors claim that users haven't shown enough interest in financial EDI to warrant developing such integrated accounting/EDI packages. Most are waiting on the sidelines until users more clearly define their requirements for using financial EDI.

As a result, a stalemate exists between users and vendors, the report stated. Each side is waiting for the other to make the moves that will pave the way for widespread use of financial EDI.

"It's kind of [a] chicken-and-egg situation, and unfortunately, no one is really taking the initiative to break the stalemate," Rostorff said.

The report makes several recommendations for removing the impediments standing in the way of financial EDI.

First, the report stated that educating treasury managers and other company officials about the benefits of financial EDI is critical. Most companies view financial EDI as a means of reducing the costs of processing paper checks, but often the cost savings aren't enough to warrant a major overhaul of accounting systems and procedures, the report said.

> "It's kind of [a] chicken-and-egg situation, and no one is taking the initiative."
>
> ▲▲▲

Other tangible benefits of financial EDI that treasury managers need to be made aware of are increased accuracy, fewer late payments, better control of disbursements, better forecasting of cash flows and closer ties with customers and suppliers, Rostorff said.

But treasury managers also need to be assured that using EDI

(continued on page 31)

Firms hard-pressed to find key skills

Users face difficulties in finding employees with expertise in leading-edge network technologies.

By Maureen Molloy
Staff Writer

Given the rapid changes in technology today, many network departments are having trouble finding employees who understand and can implement emerging network products and services.

The most difficult workers to locate, according to network managers and recruiters, are professionals conversant in both voice and data communications, as well as high-level systems integrators and local-area network designers.

Some users and labor specialists also point to shortages of workers skilled in designing and overseeing international networks, a particularly pressing problem as more companies become globalized.

Dan Martineau, president of Dunhill Professional Search of Winston-Salem, N.C., a recruiting firm that specializes in the placement of information systems professionals, said users are hard-pressed to find employees with the skills needed to tie together a variety of equipment in multivendor network environments.

That problem is increasing as companies shift from centralized processing to distributed computing architectures.

"The people who are of greatest value are those who can bridge the gap between mainframes, minis and microcomputers," he said. "Companies can't seem to find enough of these people. If they could, they wouldn't be paying people like me a lot of money to find them."

Don Thomas, senior vice-president at Creative Strategies Research International, a Santa Clara, Calif.-based consultancy, agreed.

"We see a growing need for people with very specific skills, such as familiarity with main-

(continued on page 31)

GUIDELINES

BY BRUCE ELBERT

Quick actions lessen burden of downsizing

Network managers and organizations are having to contend with corporate downsizing in unprecedented numbers.

According to a survey by the American Management Association, 36% of U.S. companies have scaled back their staffs in the past year in response to business losses. Cost centers, such as telecommunications and data processing, are relatively easy targets for downsizing efforts since they tend to employ high-priced talent. Unfortunately for net managers, downsizing doesn't diminish the work that needs to be done to keep a network running smoothly. Downsizing puts net managers in the uncomfortable position of having to reduce head count and increase productivity without demoralizing the remaining staff.

Network managers will be judged on their ability to manage this situation. To succeed, they will need to blend the tough-mindedness of a battlefield commander with the compassion of Mother Teresa.

The following guidelines can help you cope with downsizing:

- Inform your staff as soon as possible about the company's decision to downsize and its business reasons for doing so.
- Determine the tasks and functions that must still be performed by your staff.
- Critically examine each existing position to see whether it can be consolidated or eliminated.
- Create a transition plan that lays out the schedule for organizational changes. This timetable should give people the

(continued on page 31)

Elbert is director of operations for a large communications company and author of several books on telecommunications and information technology.

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See The FAXNeT Form on Page 85

Financial EDI slow to take root

continued from page 29

for payment transfers will not compromise security, audit trails and established accounting procedures.

They also need to know that the use of EDI doesn't necessarily mean they will lose the financial benefits of the three- to four-day float associated with mailing checks (see graphic, page 29).

The report also stated that vendors of accounting and EDI translation software need to begin working together to develop integrated software packages that will make it easier for companies to implement financial EDI.

These packages should provide a "total financial EDI solution" that combines accounting, EDI translation and communications modules, and is publicly supported by specific value-added network (VAN) providers and banks, the report said. In addition, the integrated software package should be flexible enough so that any piece can be modified to fit customers' specific business needs.

According to the report, the development of financial EDI software will evolve in four phases:

- **EDI hooks.** Accounting software vendors will build EDI interfaces, or "hooks," into their software, which will enable users to link their accounting systems to commercially available EDI translation packages.
- **Joint marketing agreements.** Accounting software vendors and makers of EDI translation software will work together to ensure compatibility among their products and then jointly market one another's packages.
- **Translator bundling.** Accounting software vendors will sell commercially available EDI translation software as part of their accounting software packages.
- **Seamless integration.** This is the ultimate goal. Accounting software will have EDI modules built into the code so that electronic funds transfer becomes an option on the menu screen.

Some software vendors, notably Management Science America, Inc. and Sterling Software, Inc., have already signed joint marketing agreements, but the majority of vendors have not.

"Software vendors and end users need to work together with banks and VANs in developing off-the-shelf [financial] EDI solutions that will provide businesses with a competitive advantage," the report concluded. ◼

Firms hard-pressed to find key skills

continued from page 29

frame connectivity and LAN expertise," Thomas said. "As companies grow and want more sophisticated networking options, they're finding that getting people to accomplish those goals is no easy task."

Many observers report a woeful shortage of network professionals with experience in integrated voice and data communications. These workers are increasingly in demand as more companies merge voice and data traffic onto a single network.

"We're at a point where there's a heightened awareness that data communications will be big, so companies are looking for people who know both," said Andy Olson, senior vice-president of Paul R. Ray & Carre Orban International Co., a worldwide executive search firm.

Michael Zarněk, president of Chicago-based First Search, Inc., a recruiting firm that places networking technicians, concurred.

"Voice and data are merging, so the strongest need for companies — and the hardest skill set to find — is those technicians who understand the nitty-gritty of both voice and data transmission," Zarnek said.

Users are also seeking employees with expertise in LAN design and administration.

"LANs are still a fairly new technology, and there aren't enough people out there who really understand it," said a network manager of the research and development arm of a large telecommunications manufacturer who requested anonymity. "I have a highly skilled staff, but I still have to go to headhunters to find good LAN people. It's like finding a needle in a haystack."

Other network managers are worried about staffing for international network operations as their companies expand abroad.

Olson said the need is particularly great among U.S. network vendors, who are eagerly eyeing business opportunities overseas. "Because of all the pending changes in Europe, there's a huge need for telecommunications experts who can bring these countries' telecom systems into the 20th century," Olson said. "It's a massive undertaking and a fantastic opportunity for American businesses." ◼

Quick actions lessen downsizing burden

continued from page 29

opportunity to educate one another about specific tasks.

- Get your supervisors and senior management to fine-tune the transition plan. Keep others informed and transmit the plan to your staff when it is completed.
- Work with your human resources staff to arrange a suitable outplacement program. Fight for the best benefit package available since those that are displaced will not have an easy time finding a job in today's employment market. By maintaining a posture of frankness and communicating plans as they are completed, you will minimize the disruption of services. ◼

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See The FAXNeT Form on Page 85

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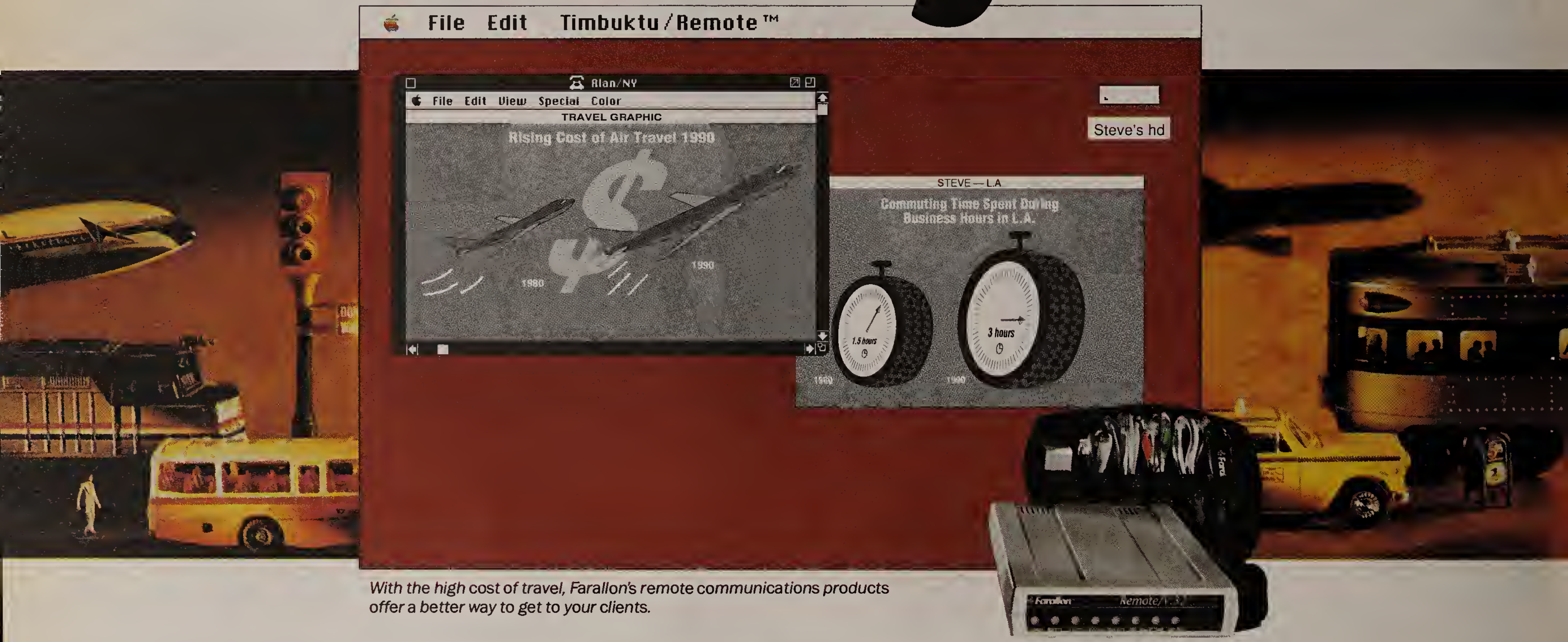
File Edit Timbuktu/Remote ™
Alan/NY
File Edit View Special Color
TRAVEL GRAPHIC
Rising Cost of Air Travel 1990
1980
1990
Steve's hd
STEVE—L.A
Commuting Time Spent During Business Hours in L.A.
1.5 hours
3 hours
1980
1990
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If you don't already own a high-speed modem, we provide everything you need in the ***Timbuktu/Remote Access Pack,***™ including our 9600 bps full-duplex Remote/V.32™ modem and a hardware flow control modem cable.

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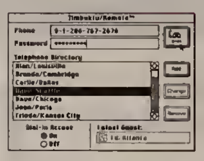
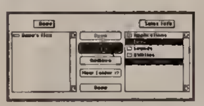
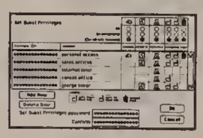
*One copy of Timbuktu/Remote and a modem are required at each location. A 9600 bps full-duplex modem is recommended.



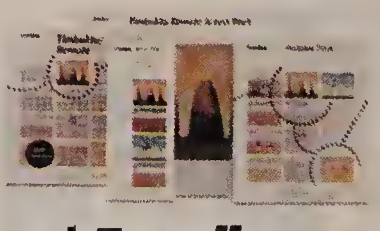
Directory
Travel to a client's office with the click of your mouse.



File Transfer
Fast, direct file transfer beats overnight delivery or e-mail.



Security
Multiple passwords and call back puts you in control.



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See The FAXNeT Form on Page 85

INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

Worth Noting

Although satellites have traditionally carried 65% of all transatlantic calls, this total dropped to 15% in 1990 with the opening of the Trans-Atlantic Telecommunications-8 and Private Trans-Atlantic Telecommunications submarine fiber cables. But by 1995, after higher capacity systems go into orbit, satellites are expected to stabilize their share of the traffic at 30% to 40%, according to the European Commission in Brussels, Belgium.

World News

AT&T last week said it has reached an agreement with the German carrier Deutsche Bundespost Telekom to lower by 17% the accounting rates for international switched telephone services between the U.S. and Germany.

Accounting rates affect the prices carriers charge users by determining how much the carrier initiating an international telephone call pays the carrier terminating the call.

Tom Luciano, deputy director of international settlements at AT&T, said the carrier will probably reduce prices for international calls to Germany once the lower accounting rates take effect on April 1, but he declined to say how much prices would fall.

Luciano added that AT&T expects to reduce accounting rates a second time in 1992. These cuts are part of AT&T's goal to reduce all accounting rates for switched services to Europe to between 44 and 55 cents per minute by 1993.

Currently, the accounting rate for service to Germany is about $1.44 per minute, although that rate fluctuates with currency values. ◼

Unisys says int'l private net will reduce switched costs

Vendor plans to phase out SDN despite benefits.

By Barton Crockett
Senior Editor

BLUE BELL, Pa. — Unisys Corp. is building a private voice network between the U.S. and Europe that is expected to slash expenditures on switched services by 14%, or $1.15 million per year.

In the process, Unisys will migrate away from the AT&T and British Telecommunications PLC Global Software-Defined Network (SDN) services that the firm cut over earlier this year and has used to tie more than a half-dozen U.K. offices into its domestic SDN.

According to Gil Piddington, Unisys' vice-president of worldwide telecommunications, Global SDN has enabled the computer maker to reduce expenditures on international telephone calls between the U.S. and U.K. by 30%.

In addition, the service has helped improve call setup time and circuit quality, as well as extend seven-digit dialing to the U.K.

But even though Unisys is happy with Global SDN, Piddington said the firm can maintain equal or better service and save even more money by using private lines.

"Putting things on our own leased lines is a cheaper way to go," Piddington said.

To use Global SDN, Unisys maintains dedicated links from its U.K. offices in London, Milton Keynes, Slough and Uxbridge to a British Telecom switch in London that acts as a gateway to SDN services from AT&T. Previously, voice communications from these locations ran over public switched facilities.

But now, Unisys is in the process of migrating Global SDN traffic to two fiber-optic T-1 links and will use Global SDN only for excess traffic that can't be carried over the private lines, according to Ken Mills, the computer maker's director of international telecommunications in Milton Keynes.

Unisys cut over its first, fiber-optic, transatlantic T-1 line last August, and its second transatlantic T-1 is now coming on-line.

Unisys plans to build a private-line network that will consist of leased circuits spanning out in a star topology from a London hub to company offices throughout Europe. Piddington said that much of the European private-line net will be installed by the

(continued on page 36)

Foreign carriers protest dual regulatory standards

By Maureen Molloy
Staff Writer

Some users may be unaware that foreign-owned carriers offering international service to U.S. companies face more stringent federal regulation than most domestic carriers — regulation that the foreign-owned service suppliers say is unfair.

William Kirsch, Federal Communications Commission attorney, said the FCC places several conditions on foreign-owned carriers, such as World Communications, Inc. (WorldComm) and Cable & Wireless Communications, Inc., operating in the U.S. The regulations were implemented, he said, to prevent service providers owned by foreign companies from using their overseas market power to influence pricing or provide favorable treatment to their U.S.-based subsidiaries.

For example, the foreign owners must file an application with the FCC each time they want to add circuits to a particular country. Most domestic carriers need only make an initial application and can later install additional circuits without FCC approval.

Kirsch said foreign-owned U.S. carriers also face greater scrutiny and less flexibility in tariff filing. While the notice period for a tariff filed by a domestic carrier is usually 14 days, a foreign carrier's tariff typically takes 35 to 45 days to obtain FCC approval. The foreign-owned carriers must also file more detailed cost information.

Kirsch also said foreign-owned carriers face more stringent regulations because they are considered dominant carriers — carriers with superior market power. Among U.S. long-distance carriers, only AT&T is considered a dominant carrier, and the FCC considers AT&T nondominant in providing leased-line and nonvoice international services.

The FCC restrictions don't sit well with foreign-owned carriers.

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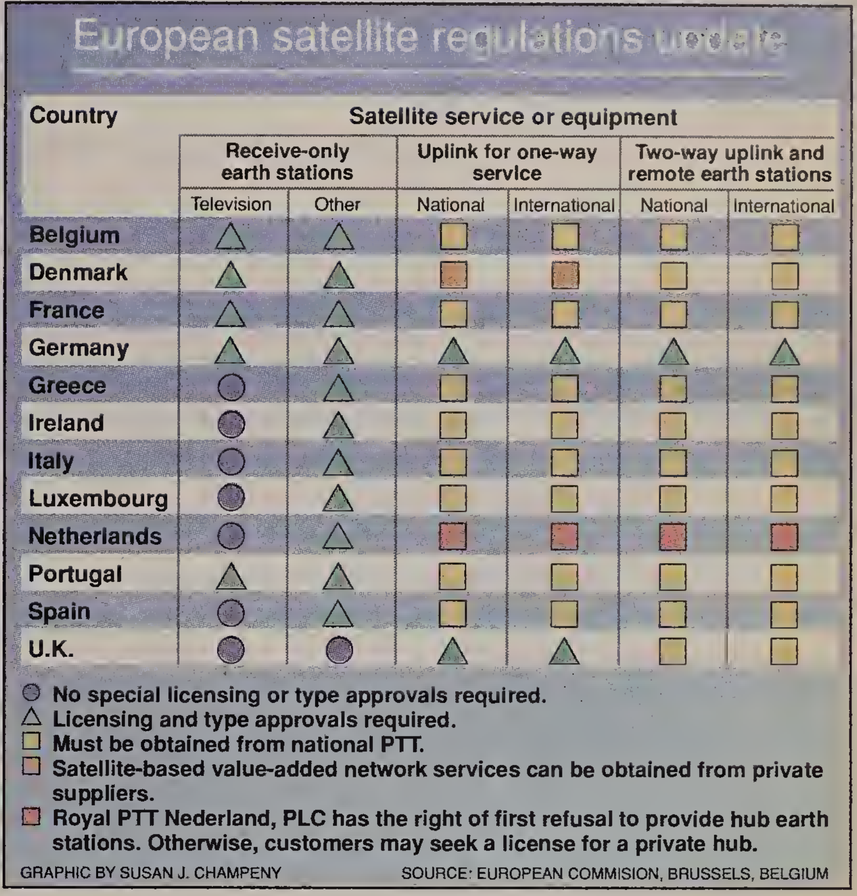


European satellite regulations update

Country	Satellite service or equipment					
	Receive-only earth stations		Uplink for one-way service		Two-way uplink and remote earth stations	
	Television	Other	National	International	National	International
Belgium	△	△	🟨	🟨	🟨	🟨
Denmark	△	△	🟧	🟧	🟨	🟨
France	△	△	🟨	🟨	🟨	🟨
Germany	△	△	△	△	△	△
Greece	●	△	🟨	🟨	🟨	🟨
Ireland	●	△	🟨	🟨	🟨	🟨
Italy	●	△	🟨	🟨	🟨	🟨
Luxembourg	●	△	🟨	🟨	🟨	🟨
Netherlands	●	△	🟥	🟥	🟥	🟥
Portugal	△	△	🟨	🟨	🟨	🟨
Spain	●	△	🟨	🟨	🟨	🟨
U.K.	●	●	△	△	🟨	🟨

● No special licensing or type approvals required.
△ Licensing and type approvals required.
🟨 Must be obtained from national PTT.
🟧 Satellite-based value-added network services can be obtained from private suppliers.
🟥 Royal PTT Nederland, PLC has the right of first refusal to provide hub earth stations. Otherwise, customers may seek a license for a private hub.

GRAPHIC BY SUSAN J. CHAMPENEY
SOURCE: EUROPEAN COMMISION, BRUSSELS, BELGIUM

EC to call for easing of satellite net rules

Proposal will support unrestricted user access to satellite services, liberalize use of earth stations.

By Barton Crockett
Senior Editor

BRUSSELS, Belgium — Later this month, the Commission of the European Communities is expected to issue a ground breaking statement calling for the relaxation of regulatory restraints on the use of satellite networks throughout the Common Market nations.

As currently drafted, the "Green Paper on a Common Approach in the Field of Satellite Communications in the European Community" calls for the abolishment of carrier monopolies over the sale of earth stations to users.

The paper also calls for free and unrestricted access to satellite capacity for users and vendors, competition in the provision of satellite services and the creation of a new licensing system that would greatly ease the establishment of private, pan-European satellite networks.

If these reforms are enacted, they would radically change the existing regulatory climate in Europe.

Currently, most European carriers maintain monopoly control over the supply of satellite capacity and one- and two-way earth stations (see graphic, this page). As a result, private satellite nets are far less common in Europe than in the U.S.

"By now, there are approximately 40,000 [very small aperture terminals] in operation in the U.S., of which about one-third are receive/transmit stations, compared to a few hundred receive/transmit stations in Europe," the European Commission wrote in a Sept. 22 draft of the satellite services green paper.

Carrier control over satellite facilities has made it difficult for users to employ satellite networks as an alternative to the disparate terrestrial technologies of Europe's carriers in building pan-European networks.

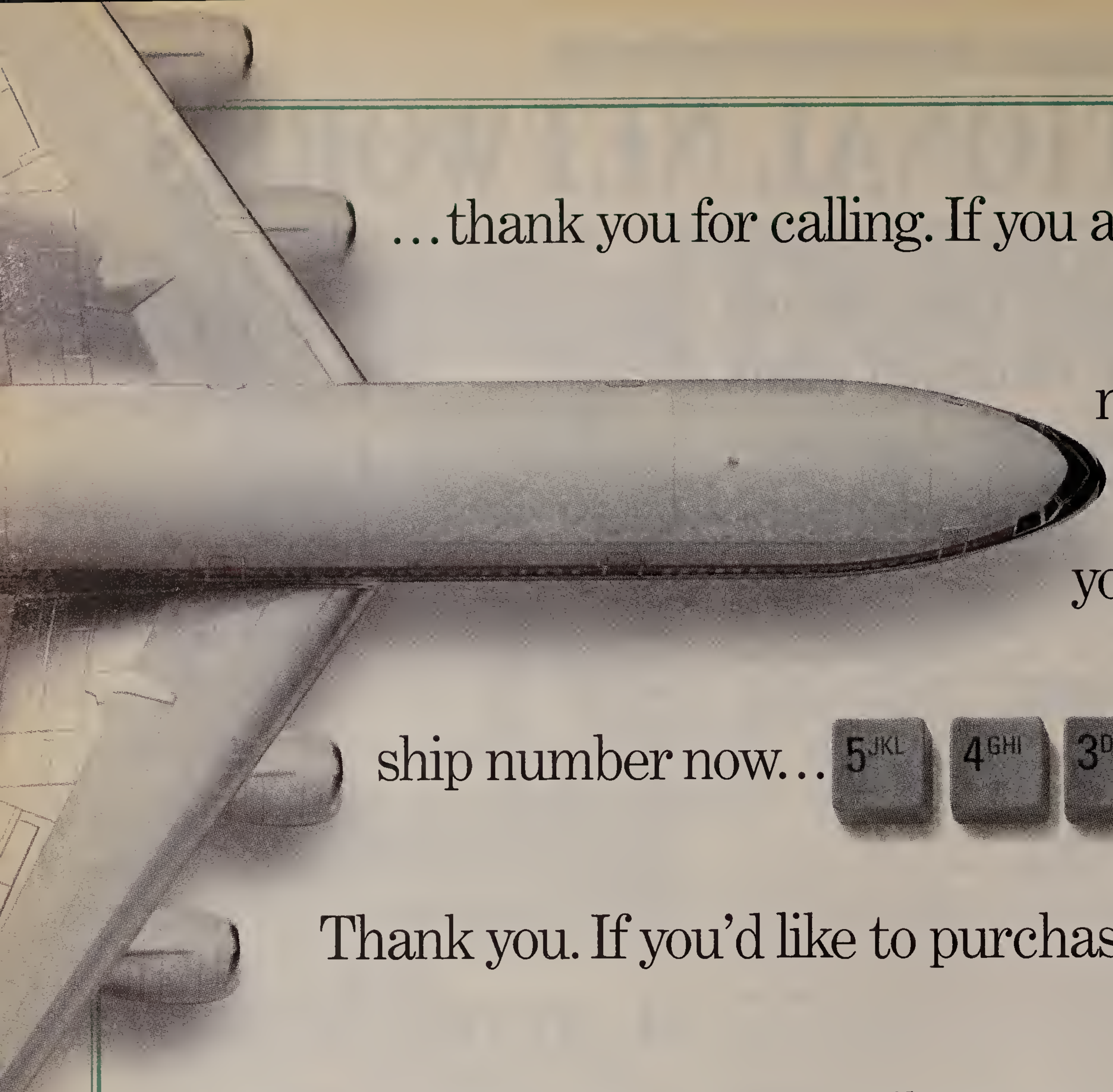
> If these reforms are enacted, they would change the existing regulatory climate.

▲▲▲

The European Commission added that business prospects for European vendors have been hurt by the lack of a vibrant domestic market for satellite communications services. The paper stated that the lack of domestic demand has caused European vendors to underinvest in satellite technologies.

The report concludes that regulatory barriers to satellite services must be dropped for European vendors to stand a chance of

(continued on page 36)



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Thank you. If you'd like to purchase a ticket, press 1. If you'd like to know your mileage account balance, press 2. If you'd like scheduling or reservation information, press 3. 1 All our agents are currently busy. As an Air Gold Club member, however, your call will receive special priority.

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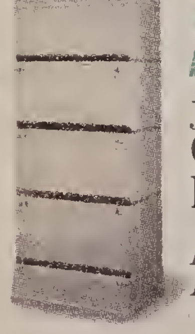

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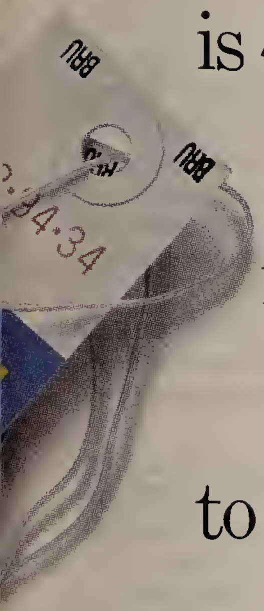
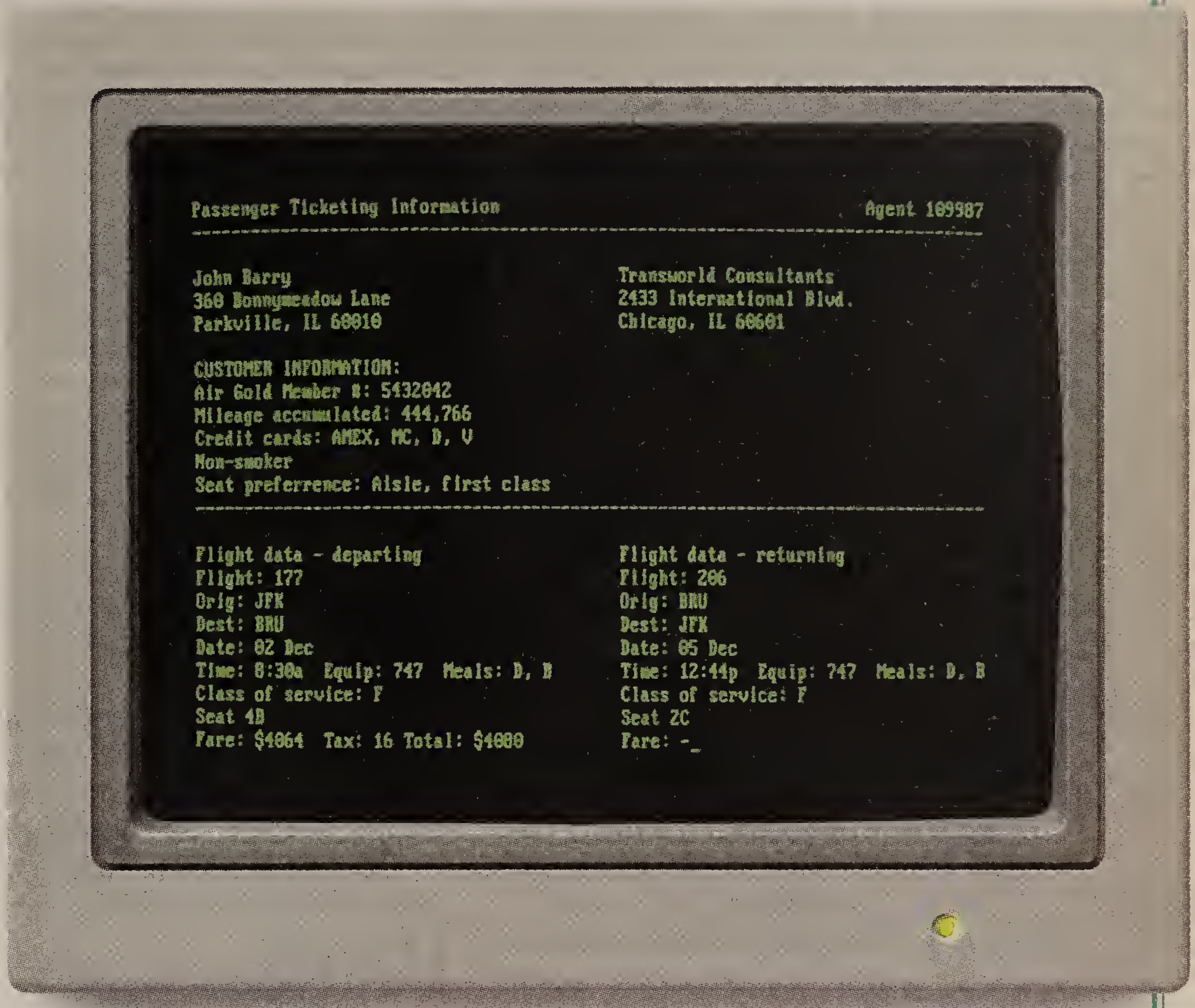
It will be handled by the next available agent in our transcontinental network. An agent will be with you shortly. In the meantime, you may wish to know your frequent flyer mileage is 444,766 miles. We are now transferring you to an agent…"Hello, Mr. Barry. Brussels on the 2nd? There's a flight available at 8:30 A.M. Fine. I've reserved your favorite seat, 4B. Would you like your special menu?…" nt northern telecom





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Passenger Ticketing Information                                  Agent 109387
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Parkville, IL 60010                         Chicago, IL 60601

CUSTOMER INFORMATION:
Air Gold Member #: 5432042
Mileage accumulated: 444,766
Credit cards: AMEX, MC, D, V
Non-smoker
Seat preferrence: Aisle, first class
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Flight data - departing                     Flight data - returning
Flight: 177                                 Flight: 206
Orig: JFK                                   Orig: BRU
Dest: BRU                                   Dest: JFK
Date: 02 Dec                                Date: 05 Dec
Time: 8:30a  Equip: 747  Meals: D, B        Time: 12:44p  Equip: 747  Meals: D, B
Class of service: F                         Class of service: F
Seat 4B                                     Seat 2C
Fare: $4064  Tax: 16 Total: $4080           Fare: -_
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NORTHERN TELECOM

TECHNOLOGY THE WORLD CALLS ON

EC to call for easing of satellite net rules

continued from page 33

competing effectively in global satellite markets.

The first step toward implementing these reforms will be adoption of the satellite green paper, which is expected to be formally approved in the last week of this month, according to spokesmen for the European Commission.

The green paper outlines regulatory initiatives that will be taken to eliminate regulatory barriers to competition in satellite markets. It will mirror the European Commission's 1987 green paper on telecommunications markets, which outlined and justified a series of regulatory reforms now being implemented.

According to the European Commission spokesmen, the satellite green paper is expected to contain nearly all of the provisions and language included in the Sept. 22 draft.

The draft states that all receive-only satellite earth stations not connected to the public net should be subject only to the same "licensing or restrictions on supply, installation, ownership, operation and maintenance" usually applied to such receiving devices as radios.

Central hub stations for one-way and two-way satellite nets will require special licenses from regulatory agencies. In principle, however, these licenses will be routinely approved and private hub station operators will be allowed to interconnect their nets with the public switched telephone network.

Licensed hub station operators will be able to operate private satellite nets or sell satellite services in competition with dominant post, telegraph and telephone administrations. In addition, hub station operators will be able to use a license obtained in one country to build satellite nets and market satellite services throughout the Common Market.

There will be no requirement to go through separate licensing proceedings for each country in which a satellite net is extended.

The satellite green paper also calls for the abolition of carrier monopolies on supplying transponder space to users.

This would be accomplished by first allowing such organizations as the European Telecommunications Satellite Organization (EUTELSAT), a carrier-owned group operating European satellites, to market satellite capacity directly to users and satellite vendors rather than to carriers only.

Common Market countries would be required to separate the organization responsible for working with EUTELSAT and the International Telecommunications satellite organization from the dominant PTT, similar to the way Communications Satellite Corp. in the U.S. is separated from AT&T.

These organizations, in turn, would be required to base prices for satellite capacity on actual provisioning costs and to offer capacity on a nondiscriminatory basis.

The only restrictions countries could maintain would be prohibitions against using private satellite networks to sell services — such as switched voice services — over which the European Commission still allows carriers to maintain monopoly control. Minimum technical safeguards would also be set up to ensure that competing satellite services don't interfere with one another. ◼

Unisys: Private net will reduce costs

continued from page 33

first quarter of next year.

All calls placed on the private-line net will be routed via the London hub. The private-line net will replace international switched services in Europe for intracompany traffic and will support seven-digit dialing and access to Unisys' domestic SDN. In the future, the European net will support data as well as voice.

But even though Unisys is moving away from Global SDN in Europe, the company is charging ahead with the service in the Pacific Rim.

Piddington said Unisys is installing a Global SDN link in Australia that will integrate company offices in eight Australian cities into Unisys' domestic SDN. Unisys similarly plans to cut over Global SDN service in Japan once regulators in that country give their nod to the offering.

Piddington said Unisys does not know yet if it will replace Global SDN service to these countries with international private lines. ◼

Foreign carriers protest standards

continued from page 33

Robert Conn, an attorney for WorldComm, a New York-based carrier owned by TeleColumbus AG of Baden, Switzerland, called the FCC restrictions "unnecessary and burdensome," and said WorldComm should not be considered dominant.

"It's ironic that [WorldComm] is considered a dominant carrier when we're actually much smaller than some carriers that are labeled nondominant, like MCI," Conn said.

He said the longer tariffing process and the added cost information required with each filing presents an even greater obstacle. "A U.S.-owned carrier can look at our tariff and then file their own tariff with a cheaper rate on 14 days notice, and then have their tariff go into effect before WorldComm's has even cleared," Conn said. ◼

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Not only because the move to high-speed modems is in full swing, but because no other 9600 can deliver the features, performance, and networking capabilities of the fully loaded ULTRA 96.

ULTRA 96 provides up to 4-to-1 data compression, so it can save you money by letting you run computer equipment at its maximum speed.

In fact, you'll save so much on long-distance charges, your ULTRA 96 will pay for itself in just a few months. And its unique X.32 (Dial X.25) capability allows users to take advantage of the lower costs associated with the use of national and global packet-switched networks.

Of course, ULTRA™ works just as well on leased lines, satellite links, and other networks. It even automatically negotiates the best connection with other modems. Hayes or otherwise.

Plus, it uses the world standards for error-control and data compression, V.42 and V.42bis, and it can downshift to MNP® levels 2 through 5.

What's more, ULTRA 96 is compatible with the most popular high-speed modem on the market. The Hayes V-series® Smartmodem 9600.™

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For more information about Hayes ULTRA 96, call 1-800-635-1225.

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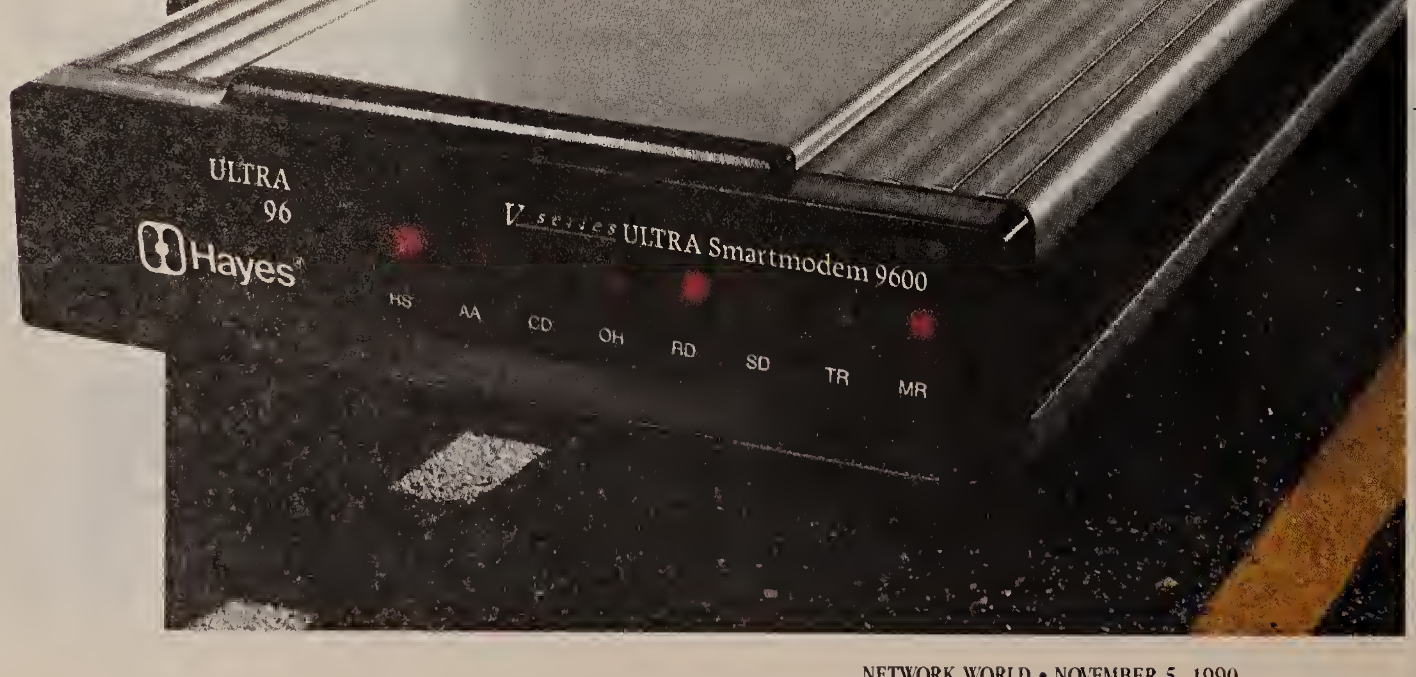
At 38,400 bps, it's not only the fastest V.32 modem on the street, it's the fastest off the showroom floor.



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PRODUCTS & SERVICES

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First Look

AT&T plans to release software for small users

AT&T's Computer Systems unit recently announced two software packages for local-area networks serving small companies or departments within corporations.

The **StarGroup LAN Manager Server EL-1** package comes with a two-user version of Unix System V Release 3.2.3 and an eight-user version of StarGroup LAN Manager Server Release 3.3.

The company is also offering **StarGroup LAN Manager Server EL-2,** which provides the same software as the EL-1 package, plus an eight-user version of PMX/StarMail electronic mail software.

StarGroup LAN Manager Server supports from two to 200 users.

AT&T is offering promotional prices for the EL-1 and EL-2 packages, which will sell for $1,895 and $2,195, respectively. Those prices will be in effect until Jan. 31, when the products will go up to $2,295 and $2,595, respectively. The software is available now.

Du Pont unit rolls out bridge for LAN One

E.I. du Pont de Nemours & Co.'s Electro-Optic Products Group recently unveiled an **Ethernet Bridge Module** for its LAN One fiber-optic wiring concentrators.

The bridge is a single-card device that fits into the LAN One. It comes bundled with **Enhanced Management Software,** which provides custom filtering capabilities.

The software enables network managers to define devices and packet types on the bridge's subnetworks. Network staff can grant those devices access to certain portions of the network or restrict them solely to a single subnet.

The Ethernet Bridge Module and the Enhanced Management Software option cost $2,995 and $1,995, respectively.

E.I. du Pont de Nemours & Co.'s Electro-Optic Products Group, P.O. Box 13625, Research Triangle Park, N.C. 27709; (800) 888-5261.

(continued on page 40)

Sprint offers turnkey EDI, X.400 switch

By Bob Brown
Senior Editor

SAN FRANCISCO — US Sprint Communications Co. introduced a turnkey electronic data interchange system based on hardware from Tandem Computers, Inc. and software from Harbinger*EDI Services, Inc. at the recent Electronic Messaging '90 conference here.

US Sprint also unveiled the TPX400, an X.400 messaging switch that will enable large users to swap messages among multiple messaging systems via a single communications processor.

US Sprint's new EDI offering, dubbed US Sprint EDI, is designed to make it easier for large companies to exchange structured business documents with trading partners over US Sprint's SprintNet value-added network or its core long-distance network.

US Sprint EDI replaces a previous EDI offering that the carrier resold from Sterling Software, Inc.

US Sprint's turnkey offering includes personal computer EDI software, which is based on software developed by Harbinger* EDI Services, as well as Tandem system and messaging software.

The personal computer software performs translation of EDI formats and allows users to add trading partners in a real-time, interactive mode.

It also contains an error notification capability that alerts document senders immediately when they have sent a flawed EDI document.

The Tandem processor and software is designed to store and forward EDI messages, generate statistics and perform billing functions. US Sprint's Telemail electronic messaging software is also bundled into the system. Thus, it is possible that some customers will run both their Sprint EDI System Software and Telemail on the same system, said Michael Mansouri, executive director of business development at Sprint International.

For users that already have EDI software running on a mainframe or minicomputer and don't want to invest in Tandem hardware, US Sprint is installing Tandem computers in its network to provide store-and-forward services. US Sprint is also offering translation software that works in conjunction with Tandem computers on US Sprint's network.

The personal computer software will be priced at $2,000, and

(continued on page 39)

Ethernet server supports multiprotocol WAN links

TCP/IP device offers eight ports, speeds to T-1.

SAN DIEGO — Simpact Associates, Inc. recently announced a TCP/IP Ethernet communications server that supports eight wide-area links at up to T-1 speeds.

The CNS 6000 will let client workstations on Ethernets running Transmission Control Protocol/Internet Protocol access High-Level Data Link Control- and X.25-based wide-area links.

The company said it would port its existing protocol software to the server in 1991, adding support for such protocols as Binary Synchronous Communications, Digital Equipment Corp.'s Digital Data Communications Message Protocol, the Advanced Data Communications Control Procedure (the ANSI version of HDLC/Synchronous Data Link Control) and the Simple Network Management Protocol.

The server's resource management software and real-time operating system arbitrate client requests for access to the ports. The ports and protocols supported can be reconfigured in real time in response to client demands. The TCP/IP software on the CNS 6000 has been optimized for speed, supporting data rates up to 1.8M bit/sec over Ethernet, according to the company.

Although the device will ultimately support a variety of Simpact protocol software, it is programmable and can be used to support virtually any standard or custom protocol. To help develop custom protocols, the firm offers a software development tool kit that includes a real-time operating system, sample protocol source code for BSC, asynchronous and bit-synchronous protocols, a TCP/IP interface and documentation.

The CNS 6000 is expected to be available later this month and ranges in price from $7,950 to $15,000, depending on the protocol configuration required.

Simpact can be reached by writing to 9210 Sky Park Court, San Diego, Calif. 92123, or by calling (619) 565-1865.

Compulink brings imaging to NetWare

Software enables Novell NetWare users to access compound document files from a central server.

By Charles Bruno
Assistant Managing Editor

TORRANCE, Calif. — Compulink Management Center, Inc. recently announced imaging software for Novell, Inc. NetWare local-area networks.

Compulink's LaserFiche LAN enables NetWare users to summon compound document files, including text, graphics and images, from a central file server.

The company said the software represents a shift in the imaging market away from systems based on proprietary hardware that force users to set up a separate image network in parallel with other networks. Instead, LaserFiche LAN runs on industry-standard personal computer file servers, enabling NetWare clients to access a document from within standard business applications such as word processing programs or spreadsheets.

"Our goal is to let customers leverage their existing network investment," said Nien-Ling Wayman, Compulink's founder and chief executive officer. "This is a sign that the image industry is maturing."

(continued on page 39)

Foresight package helps test IBM host-based EDI

COLUMBUS, Ohio — Foresight Corp. has announced The EDI Simulator, a product the firm says will enable users to test their IBM host-based electronic data interchange systems by simulating various conditions.

The product includes documentation describing a test methodology to help users identify what should be tested and show them how the tests can be performed most efficiently, said Foresight President Bob Fisher.

Once the decision about what to test has been made, the other product components are used to create the test scripts and generate the test data.

The tests are generated using EDISIM Script Builder, an application for DOS-based microcomputers with a high-level scripting language customers use to describe the EDI transactions and the number of partners to be involved in a simulation. The software features windows, pull-down menus and mouse support.

Once the script is built, it is uploaded to EDISIM Test Data Generator, which is mainframe software running under MVS or DOS/VSE. The data generator uses the script file to create the information to be fed into the customer's mainframe-based EDI software system in order to see how it will react to different types of network activity.

The product, for example, can be used for error, performance and capacity testing, Fisher said.

With error testing, customers can generate a variety of errors that typify clerical mistakes and see how their EDI software handles them. In performance testing, users can increase the amount of data in document fields or the number of documents processed in order to see how it degrades performance.

Performance testing can be taken a step further by using the product to check overall system capacity, seeing if and when parameters such as disk and buffer space are exceeded.

> Users can generate a variety of errors and see how their EDI software handles them.

▲▲▲

Fisher said performance and capacity testing is becoming more important as the volume of EDI traffic increases. EDI transaction levels at some firms double every six months, he said.

The EDI Simulator, which can be used with any IBM host-based EDI software, costs $29,500 and includes the methodology, the script builder and the data generator. It is expected to be generally available in January.

Foresight can be reached by writing to 7660 Bellaire Ave., Dublin, Ohio 43017, or by calling (614) 766-6663.

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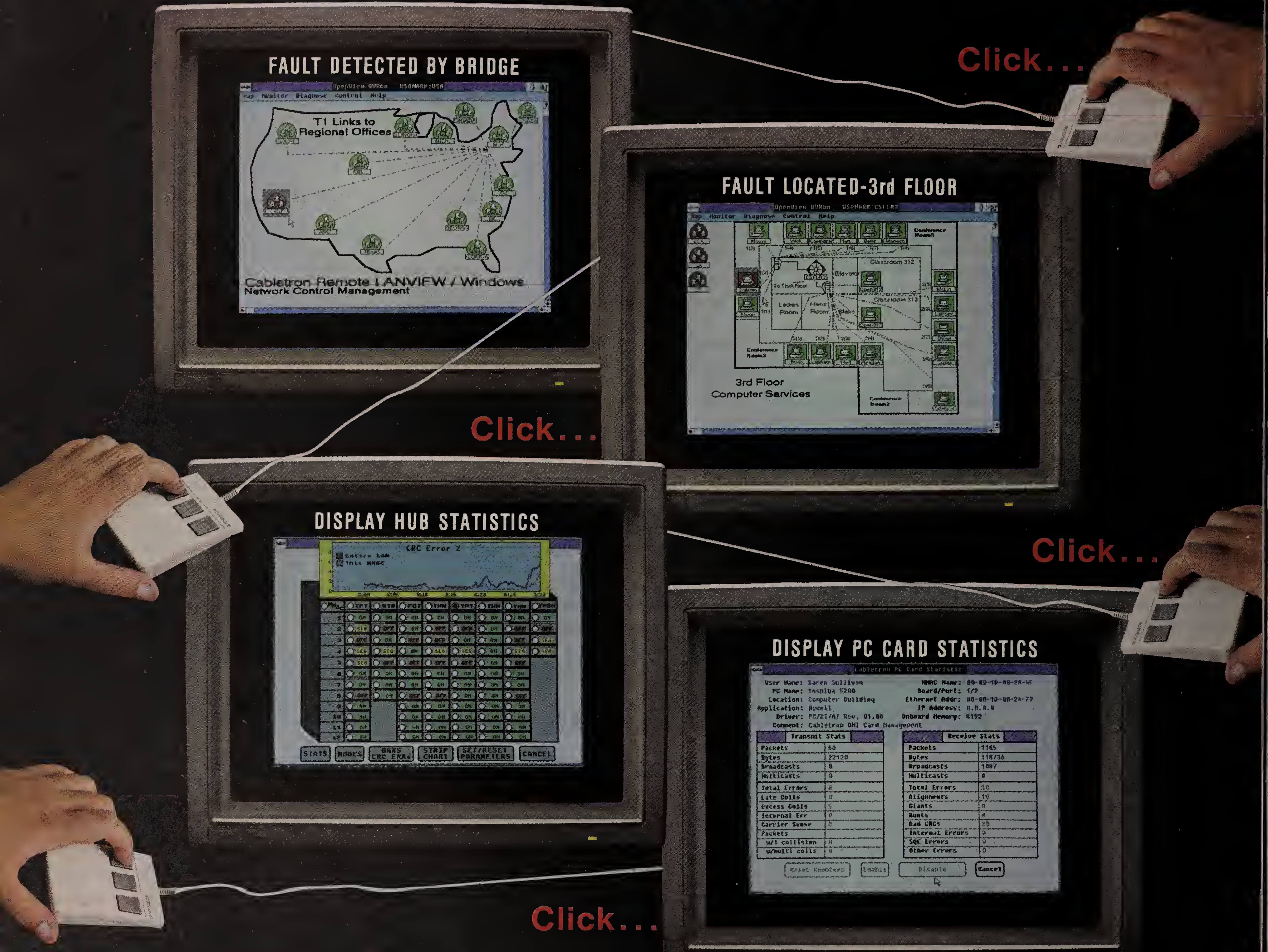

User Name: Karen Sullivan
PC Name: Toshiba 5200
Location: Computer Building
Application: Novell
Driver: PC/XT/AT Rev. 01.00
Comment: Cabletron DNI Card Management
MMAC Name: 00-00-1D-00-28-4F
Board/Port: 1/2
Ethernet Addr: 00-00-1D-00-24-79
IP Address: 0.0.0.0
Onboard Memory: 8192

Transmit Stats	
Packets	56
Bytes	22120
Broadcasts	0
Multicasts	0
Total Errors	0
Late Colls	0
Excess Colls	5
Internal Err	0
Carrier Sense	0
Packets	
w/1 collision	0
w/multi colls	0

Receive Stats	
Packets	1165
Bytes	118736
Broadcasts	1087
Multicasts	0
Total Errors	30
Alignments	10
Giants	0
Runts	0
Bad CRCs	20
Internal Errors	0
SQE Errors	0
Other Errors	0

Cabletron's Remote LANVIEW™/Windows is the world's first network management software package to offer completely integrated world-wide desktop LAN/WAN management from a central control console.

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See The FAXNeT Form on Page 85

ompulink brings naging to NetWare

ntinued from page 37

LaserFiche LAN runs on a nondedicated tWare server, taking up almost 2M bytes server memory and 2,000 bytes for each iage file.

Users scan in images or import data via csimile machines. LaserFiche LAN stores ose files in a central data base on the rver or supports a data base distributed ross several servers. It creates a 2,000-te index file of all images, graphics and xt documents, cataloging each by a variy of identifiers. This allows users to call p an entire file or just a single portion, ich as a graphic, just by entering the ame of that image. In effect, the software onducts a word search through its index.

When a file is scanned into LaserFiche AN, the software translates text and raphics into a single, bit-mapped image nd indexes every word so users can pull ıp any portion of the file.

The software includes a configuration nanager that lets network administrators dentify the word processing packages ısed across the network. Once network ersonnel select the word processing aplications with which LaserFiche LAN will perate, the software automatically interfaces with those applications enabling users to request compound documents from within a word processing program. LaserFiche LAN also comes with a custom menu interface so users can link up with other applications such as Lotus Development Corp.'s 1-2-3.

LaserFiche LAN also comes with an image folder feature that enables users to store certain documents, such as sales forecasts, in an electronic folder that can be forwarded via electronic mail to a user.

Wayman said users can put several copies of a document in different image folders and attach notes to the folders in the same way an E-mail message is appended to a file being sent to a recipient.

The software provides record locking and usage tracking, which ensures that only one user has update access to a document while others may only be granted read access. LaserFiche LAN also offers several security levels that restrict user access to portions of the index.

"The software paid for itself the first time I could put my finger on an image of the original document I needed and respond to a client when I had him on the phone," said James Veach, vice-president and assistant general counsel for Executive Life Insurance Co. in Los Angeles.

While LaserFiche LAN does not require users to install proprietary processors, NetWare administrators should be aware that the software will require them to add substantial storage and input devices such as scanners or fax machines.

> LaserFiche LAN also comes with a custom menu interface.
>
> ▲▲▲

Wayman said users could reserve hard disk storage on a server for archiving image files, but she admitted that users would be better off installing high-capacity optical disk drives or write once, read many times (WORM) drives.

LaserFiche LAN runs on networks using NetWare Version 2.15 or NetWare 386, although Compulink recommends the latter because it supports storage memory in excess of 255M bytes. Compulink is also working on a version of the software for OS/2 LAN Manager networks.

LaserFiche LAN costs $7,995 for server software and $500 for each client workstation. Compulink is also offering a site license for $25,000.

Compulink Management Center can be reached by writing to 370 S. Crenshaw Blvd., Suite E-106, Torrance, Calif. 90503, or by calling (213) 212-6820. ☒

Sprint offers turnkey EDI, X.400 switch

continued from page 37

users will be able to send documents across packet-switched or dial-up voice lines for between 25 and 35 cents per document.

The turnkey package will be available later this month. The personal computer software sells for $2,000; the base price of the Tandem computer and the corresponding EDI software ranges from $600,000 to $1.5 million, depending on whether the system is for a private company or a carrier.

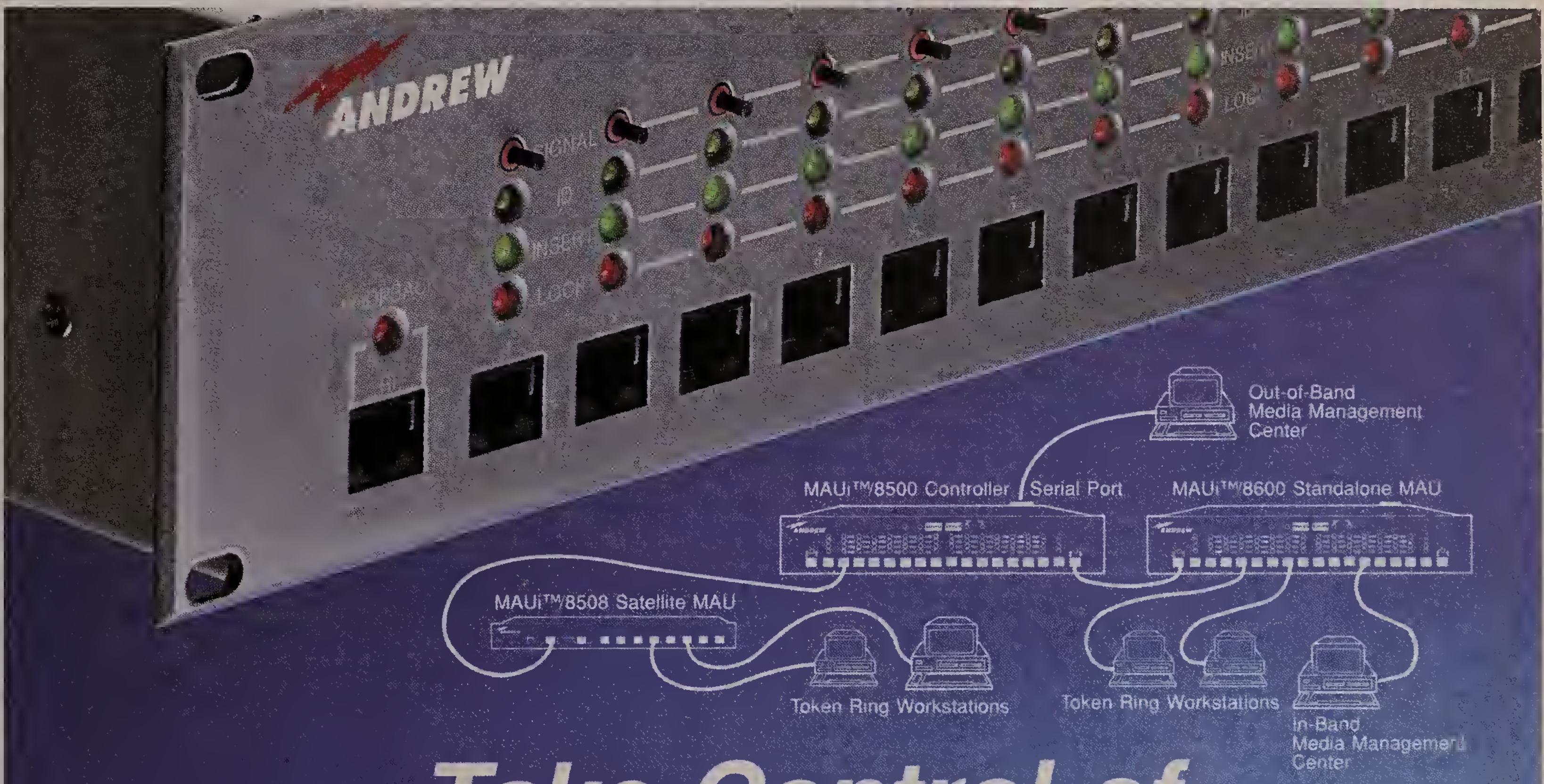
US Sprint also announced an X.400 messaging switch designed to let users exchange messages between different public and private messaging systems via a single communications processor.

For example, a user of a private E-mail system within a corporation could send a message over a public E-mail net via the TPX400 switch.

The TPX400 will complement existing mail systems, such as US Sprint's Telemail, by off-loading the processing of X.400 messages to a separate unit, he said.

The TPX400 will be offered in both non-fault-tolerant and fault-tolerant models. Both models are based on Reduced Instruction Set Computer 32-bit microprocessors that provide the throughput and memory base necessary to support multiple mail systems and allow messages of unlimited size to be exchanged.

The TPX400 switches will be priced from $150,000 to $500,000, depending on configuration. They will be available in the first quarter of 1991. ☒



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First Looks

continued from page 37

Simware packs support Mac gateways to IBM nets

Simware, Inc. recently enhanced its SimMac connectivity software to provide Apple Computer, Inc. Macintosh users with gateways to IBM host-based systems.

SimMac Version 3.1 adds support for Tri-Data Systems, Inc.'s Netway-1000 and Netway-2000 gateways, which provide IBM 3270 terminal-emulation capabilities for Macintosh users to access mainframe-based applications.

Rather than present Macintosh users with a 3270 interface, SimMac 3.1 converts 3270 data from the Netway gateways for display on the Macintosh user interface.

Previously, SimMac enabled Macintosh users to set up coaxial connections and local-area network gateways and to conduct protocol conversions with IBM hosts over asynchronous, X.25 or Synchronous Data Link Control lines.

SimWare 3.1 costs $395 for a single-user version. The software is available now.

Simware, Inc., 20 Colonnade Road, Ottawa, Ontario K2E 7M6; (613) 727-1779.

Synexus software guards servers from power failures

Synexus, Inc. recently announced its **Power Monitor** software, which protects Novell, Inc. NetWare file servers during power failures.

Power Monitor is a Novell value-added process application that resides in the server and communicates over RS-232 ports with any uninterruptible power supply system, instructing it to kick in when main power systems fail.

By contrast, other power protection products require users to install a controller card in the file server.

The software instructs a user to log off when an alternating current power line fails. In the event of a prolonged outage, Power Monitor shuts down its server to protect against a hard disk crash.

The software is available now for $175.

Synexus, Inc., 3 Osage Road, Canton, Mass. 02021; (617) 828-9390.

AT&T division releases API for PC-based ISDN

AT&T's Network Systems Group recently introduced an application program interface (API) for its Personal Computer Terminal Adapter (PCTA) Model 1000 ISDN terminal adapter.

The API will make it easy for users to create personal computer-based Integrated Services Digital Network applications that use a caller's telephone number to look up account information and present it to an agent answering an incoming call.

The API was developed by Excelltech, Inc. of Yankton, S.D., AT&T said. The carrier will also sell that company's ExcellNet and Network Basic I/O System software, which will enable users to support file transfer and printer sharing across ISDN networks. The API will ship in December.

PCSI announces mux exhanced with fax feature

Pacific Communications Sciences, Inc. (PCSI) recently announced an enhanced version of its CS4100 Clarity Series voice/data multiplexer that includes an optional facsimile processor.

The new fax feature enables users to transmit and receive Group III faxes at full 9.6K bit/sec rates, as opposed to slower speeds on voice channels. The CS4100 combines four voice channels plus a synchronous data channel for transmission over 56K or 64K bit/sec circuits.

With the facsimile option, fax calls originating on any of the four voice channels are automatically detected and the channel is switched to a facsimile mode. The signal is demodulated and multiplexed with other channels for transmission.

At the receiving end, the signal is reconstructed into the facsimile format and delivered to the receiving fax machine.

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Simultaneous with the introduction of the facsimile feature, PCSI is lowering the price of its CS4100 from $7,950 to $6,400.

The same unit, together with the fax feature, will cost $8,950.

The fax feature is currently available.

Pacific Communications Sciences, Inc., 10075 Barnes Canyon Road, San Diego, Calif. 92121; (619) 535-9500.

HP unveils software to comply with X/Open

Hewlett-Packard Co. recently introduced two application program interface (API) tools for Open Systems Interconnection networks that will enable users to integrate applications with electronic data interchange translation software and Office Document Architecture formats.

In addition, HP said it has begun shipment of its X.500 directory services software for OSI networks.

HP's **X/Open Transport Interface (XTI)** software enables applications on different computers to communicate, thereby enabling users to develop distributed applications that can be shared across a network.

It supports X/Open, Ltd.'s portability specification.

HP's **X.400 API** enables users to integrate EDI applications with X.400 software so EDI documents can be routed via electronic mail across a network.

HP's XTI comes bundled with the company's OSI Transport Service, which is priced from $3,000, depending on the processor used.

The X.400 API comes with HP's X.400 product, with prices starting at $6,000, depending on the processor.

Hewlett-Packard Co., 19310 Pruneridge Ave., Cupertino, Calif. 95014; (800) 752-0900.

Megahertz announces IBM emulation board for laptops

Megahertz Corp. recently announced an IBM 5250 terminal-emulation board for Toshiba Corp. laptop computers.

The **EasyTalk 5250** enables Toshiba users to emulate 5250 terminal communications with IBM's System/34, System/36, System/38 or Application System/400 minicomputers.

The board comes bundled with Emerald Technology Group, Inc.'s 5250 emulation software and keyboard maps.

Multiple session and hot-key support enables users to switch between personal computer applications and terminal-emulation functions.

The card fits into Toshiba's T1200 series laptops (with the exception of the T1200XE), as well as into its T1600, T3100, T3200SX, T5100 and T5200 laptops.

The product costs $899 and is scheduled to ship this month.

Megahertz Corp., 4505 South Wasatch Blvd., Salt Lake City, Utah 84124; (801) 272-6000.

White Pine software gives Mac users videotex access

White Pine Software has announced **VTXpress,** software for Apple Computer, Inc. Macintosh microcomputers that enables users to access Digital Equipment Corp.'s VAX VTX videotex product. VAX VTX is an information retrieval product that lets companies give employees electronic access to information such as company policies and procedures.

VTXpress, developed under a joint agreement with DEC, provides the Macintosh interface, including windows, icons, menus and pointers. For users familiar with the DEC VTX standard command line interface, VTXpress emulates three standard DEC keypads: DEC Terminal, All-In-1 and Common keypads.

VTXpress can support multiple sessions through separate Macintosh windows, allowing users to view multiple VTX infobases. The product comes with DECnet connection software and CommSolutions, an additional White Pine product.

During its initial introduction, VTXpress customers will receive CommSolutions free of charge. VTXpress is available now and costs $399.

White Pine Software, 94 Route 101A, P.O. Box 1108, Amherst, N.H. 03031; (603) 886-9050. ◻

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This is all of them. From left to right: The new Macintosh Classic, the well-established Macintosh SE/30, the Macintosh Portable, the new Macintosh LC, the new Macintosh IIsi, plus the Macintosh

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And a $999* price that includes the built-in monitor, 1MB of RAM, keyboard, mouse, and system software.

The 40MB hard disk is optional.

Its processor is an 8 MHz 68000 chip. And it outperforms even its popular predecessor, the Mac® SE.

The charts shown use figures included in a 1990 study conducted by Diagnostic Research, Inc., among Fortune *1000 MIS managers familiar with Macintosh and MS-DOS or Windows systems. Call and we'll send you*
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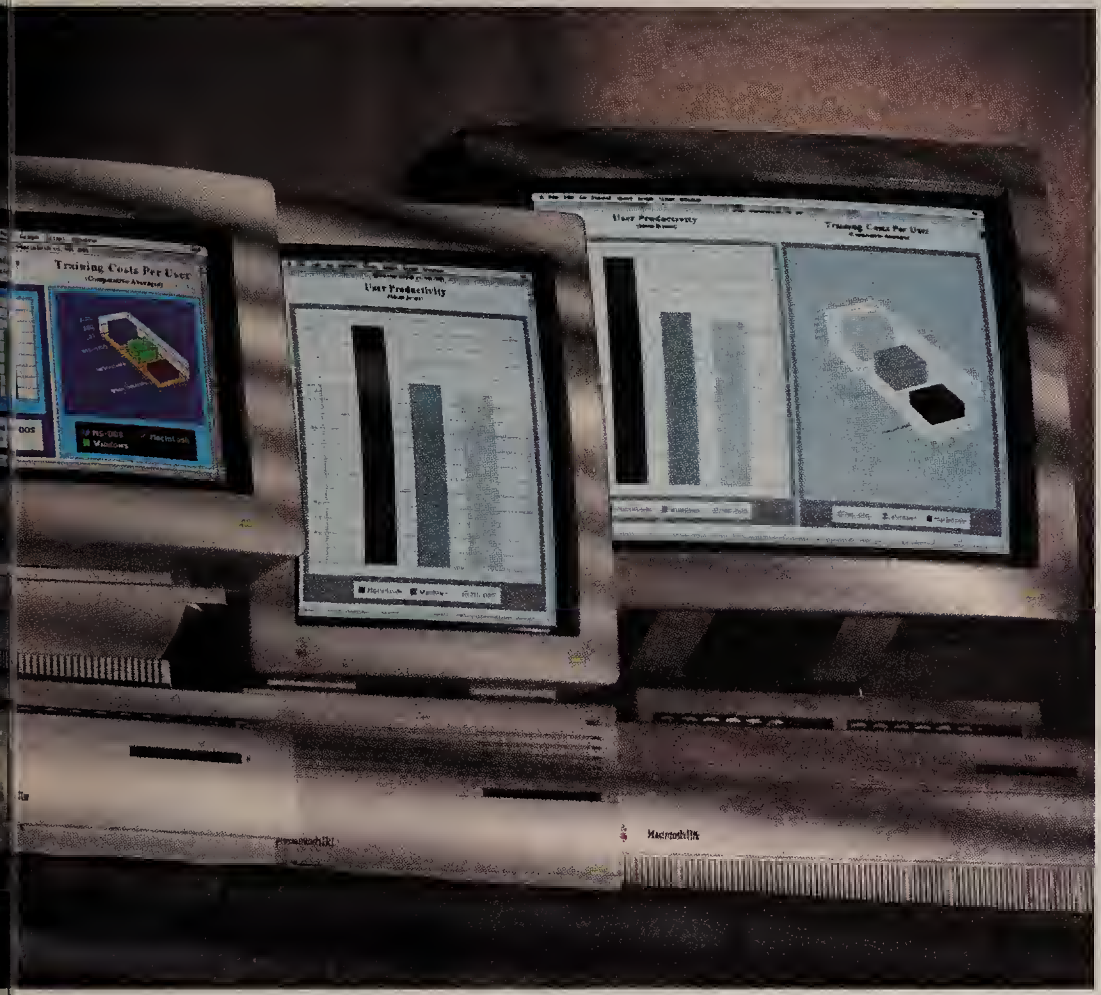

IIci, and the Macintosh IIfx. Have we left anybody out?

The Macintosh LC.

The new, low-cost Macintosh LC introduces the exquisite quality of Macintosh color and graphics to a new, wider world.

With its 16 MHz 68020 processor, it runs all the thousands of Macintosh programs at impressive speed. And, with an optional Apple® IIe Card, it runs thousands more Apple II applications as well. The Macintosh LC expands by adding a card to its standard slot. A 40MB internal hard drive is standard.

A built-in video chip runs either an Apple monochrome or low-cost color monitor—without adding a video card.

And the Macintosh LC, like the Mac IIsi, even lets you record your voice and other sounds into the computer.

Which will soon make voice-annotated E-Mail, spreadsheets, and tutorials a standard Macintosh feature.

The Macintosh IIsi.

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OPINIONS

ISDN

BY HECTOR MYERSTON

Reality falls far short of the promise

The initial design criteria for Integrated Services Digital Networks included the following commendable specifications: a public network, end-to-end digital connectivity, a limited number of standard interfaces for integrated access and support for a wide range of offerings including voice and data circuit- and packet-switched services.

Let's see how it has actually worked out:

- **Promise: a public network.** In the U.S., ISDN has developed primarily as a method for the local exchange carriers to market Centrex. The majority of ISDN or ISDN-like applications have been Centrex-related. There are precious few non-Centrex applications in support of business and, of course, no residential services. Even within Centrex, the actual number of ISDN lines is pitifully small compared with predictions. Most reliable figures indicate a total of about 120,000 installed lines, or about 10% of the predicted amount.
- **Promise: digital end-to-end connectivity.** The network is becoming increasingly digital, at least in the interexchange carrier portion. The dreaded "last mile" remains a problem. Most local exchange carriers have been slow to digitize the local loop, although in many cases, the local regulatory agencies share part of the blame for the delays.

> If we can't have real ISDN, we can at least call whatever we have ISDN.
>
> ▲▲▲

- **Promise: a limited set of standard interfaces.** This is a laugh. After several years of chanting the magic mantra "2B+D," we find that the local exchange carriers are introducing ISDN in more flavors than Baskin-Robbins. Among these: 1B, no D, for voice only; 1B, no D, for data only; 1B for voice, another for data (19.2K bit/sec), no D; and 2B+D but no user section in the D channel. Can we connect these services? Doesn't the N in ISDN stand for network? Is switched 56K bit/sec service simply ISDN with only one B channel, limited bandwidth and in-band signaling? Is a conventional T-1 link a pre-ISDN 23B plus B? Is a "dog-and-pony show" that involves a prearranged heavily monitored digital link from New York to Japan really the "first international ISDN call?"

At a recent seminar, I heard an ISDN developer brag about the "pre-ISDN" facilities he has at home: two plain old telephone service lines — one for voice and one with a modem for "high-speed" (2,400 bit/sec) data. The seminar, sponsored by a local exchange carrier, was titled "ISDN Shared Success Stories."

- **Promise: Support for a wide range of services.** It is here that ISDN has foundered in the marketplace. What does ISDN offer that is not available elsewhere in the network? Most services being described as ISDN are in reality available over interexchange carrier networks using Signaling System 7.

What can we make of all this? I have reached three simple conclusions:

- Anything can be ISDN if the seller tells us so. If we can't have real ISDN, we can at least call whatever we have ISDN, especially if it helps sell Centrex.
- It is increasingly clear that ISDN has become yet another telephone company "special service," available to those who want to pay extra for limited additional functionality.
- We should stop worrying. We will end up with a mix of services that provide anything we are willing to pay for, just as it has always been. ISDN was only a dream.

Myerston is supervisor of telecommunications analysis and installation at SRI International in Menlo Park, Calif.

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EDITORIAL

Users shouldn't hedge their bets with ISDN

It isn't by mere chance that two articles in this issue display fundamentally different perspectives toward Integrated Services Digital Networks. In the ISDN services Buyer's Guide, Contributing Editor Daniel Briere concludes that true ISDN services have been announced and more are coming. He also says these services *will* be available on a widespread basis.

Hector Myerston of SRI International takes quite a different view. In the adjoining column, he writes that ISDN services are badly fragmented, services that carriers claim to be ISDN really aren't ISDN and that deployment of ISDN local services has been pitifully slow. The implication of this attitude is that widespread ISDN won't be coming for a long time, if ever.

Basically, the two authors agree about the past. But both of their views of the future can't be true.

Some users hold one view, some the other, and a few are unwilling to commit. It's about time — now that the concept of a standard digital public network is about 15 years old, and service and equipment choices are looming — for these indecisive users to climb down off the fence.

Why? It's a matter of being prepared to deal with the parts of ISDN as they appear and with the ISDN hype that's still mounting. This may not be easy since different authorities cite the same data to indicate ISDN's future success and failure. Therefore, here are a few thoughts:

ISDN was originally supposed to *save* money for the local operating companies. The theory at the time was that digital equipment would be easier to install and service. There's no talk of that now.

ISDN telephone prices were supposed to plunge once the service was offered worldwide. Some ISDN phones now cost about $450, and some cost much more. The price may drop in the next few years — but not likely to the price of an analog set. A significant decline would require mass market movement, which isn't happening yet.

From these two points, it's easy to see that ISDN is not likely — at least in the next decade or so — to become a mass service for home users.

Despite this negativity, there's still room to be optimistic about the future of ISDN as a business-oriented service in the U.S. Public business ISDN is likely to be driven by new applications. For example, teleconferencing isn't very popular today, but it's likely to become so as switched digital and fractional T-1 circuits are used more often.

Then users will need to carry teleconferences — and perhaps other digital applications such as mixed-media messaging — on a public switched network, and that net will be ISDN.

OPINIONS

NETWORK MANAGEMENT

BY JAMES HERMAN

Multivendor platforms will allow for true integration

Network owners, operators and suppliers should pay attention to the new general-purpose, multivendor management platforms now reaching the market. With the management system market changing so rapidly, new purchases are becoming obsolete sooner than they used to.

Until recently, most of the network management development effort has focused on basic mechanisms such as reading and writing management information from the network and formatting that information for display.

Users are demanding graphics, color and other advanced user interface techniques to make network management easier. Thus, vendors are spending a great deal of time and money on these complex but basic features.

At the same time, work has been accelerating on standardized management protocols, such as the Common Management Information Protocol and the Simple Network Management Protocol, as well as on links to enterprisewide managers such as IBM's NetView and AT&T's Accumaster Integrator. This work has created requirements for many new interfaces to existing element managers solely for sending and receiving management information.

As a result, not enough development effort has gone into more advanced processing of management data, such as correlation, aggregation, analysis and automated handling of management information. These are the capabilities that users need to manage complex networks more efficiently. Many suppliers have put important upgrades to management system functionality on the back burner.

The problem is worsening as basic computer technology advances. For example, major changes are needed to enable existing products to work with the new object-oriented programming, protocol and data modeling paradigms that are the basis for Open Systems Interconnection network management. As a result, users are complaining that the management tools on the market don't do enough for them.

Now a market is developing for management system components and platforms. Vendors should no longer have to start from scratch, which means users should see faster progress in getting highly functional management systems into use.

> OSF may be in the initial stages of codifying a vendor-independent network.
>
> ▲▲▲

Several vendors, most notably Digital Equipment Corp., Hewlett-Packard Co. and Sun Microsystems, Inc., have designed general-purpose management systems that provide a base for building device-specific management products. The new platforms provide management software development environments, also known as network management operating systems.

These platforms provide the basic services that users need in their management applications: various management protocols, a management user interface and management data storage. They also incorporate the latest distributed system concepts of client/server computing and remote procedure call, among others. In addition, they use object-oriented programming and data definition techniques.

Soon users will be able to buy management application modules from different vendors that can run on the same platform. The result will be real progress toward integrated management, fewer separate management systems in large operations centers and more rapid automation. In the near future, operations managers will begin to demand that equipment suppliers write their management software to one of the leading platforms.

Vendors that build their management applications on top of one of the leading platforms will pull ahead of competitors that develop their own management products entirely from scratch.

This raises the important question of which platform should be the standard for users and vendors.

Today, choosing between HP and DEC is difficult because both platforms provide a wide range of state-of-the-art management services. HP's OpenView platform is based on Unix while DEC's DECmcc platform is based on VMS.

HP's choice of platform may sway many open systems-conscious users toward HP. However, DEC's large installed base might result in faster adoption of its platform. Also, DEC has committed to delivering an Ultrix version of its platform that will be completely compatible with the VMS version at the application program interface (API) level, although no availability date has been announced.

A decision may not be necessary. In August, the Open Software Foundation (OSF) issued a request for technology for a Distributed Management Environment. Many leading vendors, including IBM, AT&T, HP and DEC, are expected to respond to it, and OSF will probably choose a combination of APIs and services from more than one vendor for its final standard.

In other words, OSF may be in the initial stages of codifying a truly vendor-independent, industrywide network and system management platform. ◼

Herman is a principal with Northeast Consulting Resources, Inc., a Boston consulting collaborative specializing in management, communications and information strategies.

TELETOONS

BY FRANK AND TROISE

The vendor says.. they've... ..identified the problem... and it's... it's.. that we just aren't smart enough...

LETTERS

World class

I have been a reader of *Network World* for several years. Your recent advertisement touting *Network World* as "the best read, most important, most useful networking publication in America" caught my attention.

When I read that ad, I realized something about the dozens of daily, weekly and monthly publications I receive. I look forward to reading *Network World, Business Tokyo* and *Rolling Stone*. From these publications, I know I can get a feeling for what is going on in the world.

So I would change your ad to read "one of the best read, most important, most useful publications *in the world*." Keep up the good work.

Patrick Malone
President
Integrated Computer
Services, Inc.
Athens, Ga.

Rules for RFPs

Your recent article on request-for-proposal limitations ("RFP alternatives can help speed decisions," *NW*, Oct. 1) accurately described many of the concerns that inexperienced RFP writers face.

The foundation of a good RFP lies in understanding your firm's goals and objectives. Specific functional needs must be understood and expressed in a concise, easy-to-read format to which the vendor can rapidly respond with a simple yes or no.

Taking this approach eliminates the necessity for 100-page RFPs, speeds vendor response and facilitates tabulation of results. In addition, it solves the problem of business fluctuations and the short shelf life of specifications.

If the firm does not understand its specific functional needs, then a request for information may be a useful preliminary step. However, a

(continued on page 63)

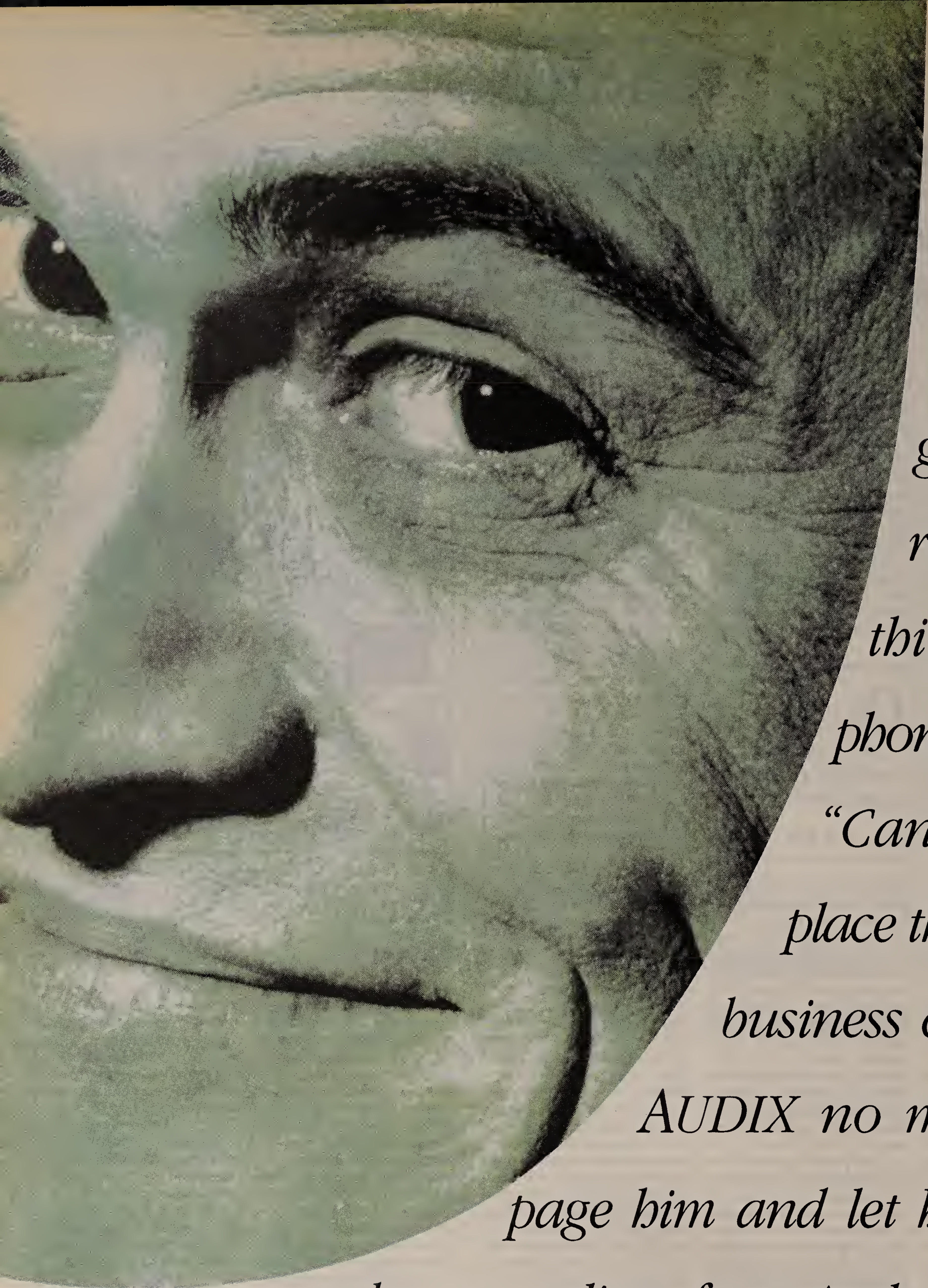
Network World welcomes letters from its readers.

Letters should be typed and double-spaced. Send to Editor, Network World, 161 Worcester Road, Framingham, Mass. 01701.

Letters may be edited for space and clarity.

LIKE ALLIGATORS IN A SWAMP, unforeseen problems can really put the bite on a communications operation. Many managers find themselves wrestling with these networking reptiles every day.

If you've survived an "alligator attack," share it with our readers by calling Susan Collins, assistant features editor, at (508) 820-7413 or fax your idea to us at (508) 820-3467. Alligators should be 1,200 words in length and submitted either on disk or via modem.



We send
put an
And it
this smoke
gets there?
reason I'm
third call to
phone because
"Can I take a
place that has an
business calls don't
AUDIX no message is
page him and let him know
tant because aliens from Andromeda are
At this point I'm put on hold. And it is my hope that if
not currently suffering the indignity of the hold button.

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up satellites like flowers to strangers. On one we
electronic greeting card and addressed it to infinity.
occurs to me, what if the people who might get
signal from planet Earth aren't around when it
What if they're in a meeting? And the only
thinking this is because I'm on the tenth ring of the
this supplier when someone finally answers the
the ringing noise is ruining his lunch. He says,
message?" And I say, "Tell Ray he needs to work for a
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reach their intended party on the first try. But with
missed. Tell him AUDIX features outcalling that can
important messages are waiting. And this is impor-
trying to reach him and they may not call back...."
there is intelligent life somewhere in the universe, it is

AT&T
The right choice.

X.400 migration strategies

By DANIEL BLUM

It's tempting to flock to X.400 now that this standard way of handling electronic mail has become so popular.

In fact, now that the X.400 Message Handling System (MHS) has become part of the Government Open Systems Interconnection Profile (GOSIP) purchasing requirements, increasing numbers of vendors and users are likely to migrate from proprietary systems to X.400.

But before making that journey, there are plans that must be made. Migrating to X.400 is not going to be as easy as booking a winter cruise.

Issues that should be considered are: How should user organizations chart the transition process; and which X.400 features can be bought now, which in two years and which in five years? In short, before considering a transition to X.400, users should determine whether they really need it.

The X.400 package has more features than some users may need. X.400 (also known as MHS) is a multimedia mass-message distribution system with very broad functionality.

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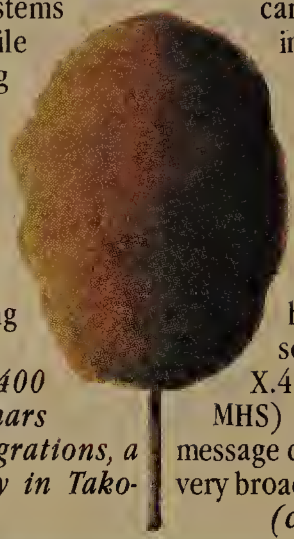
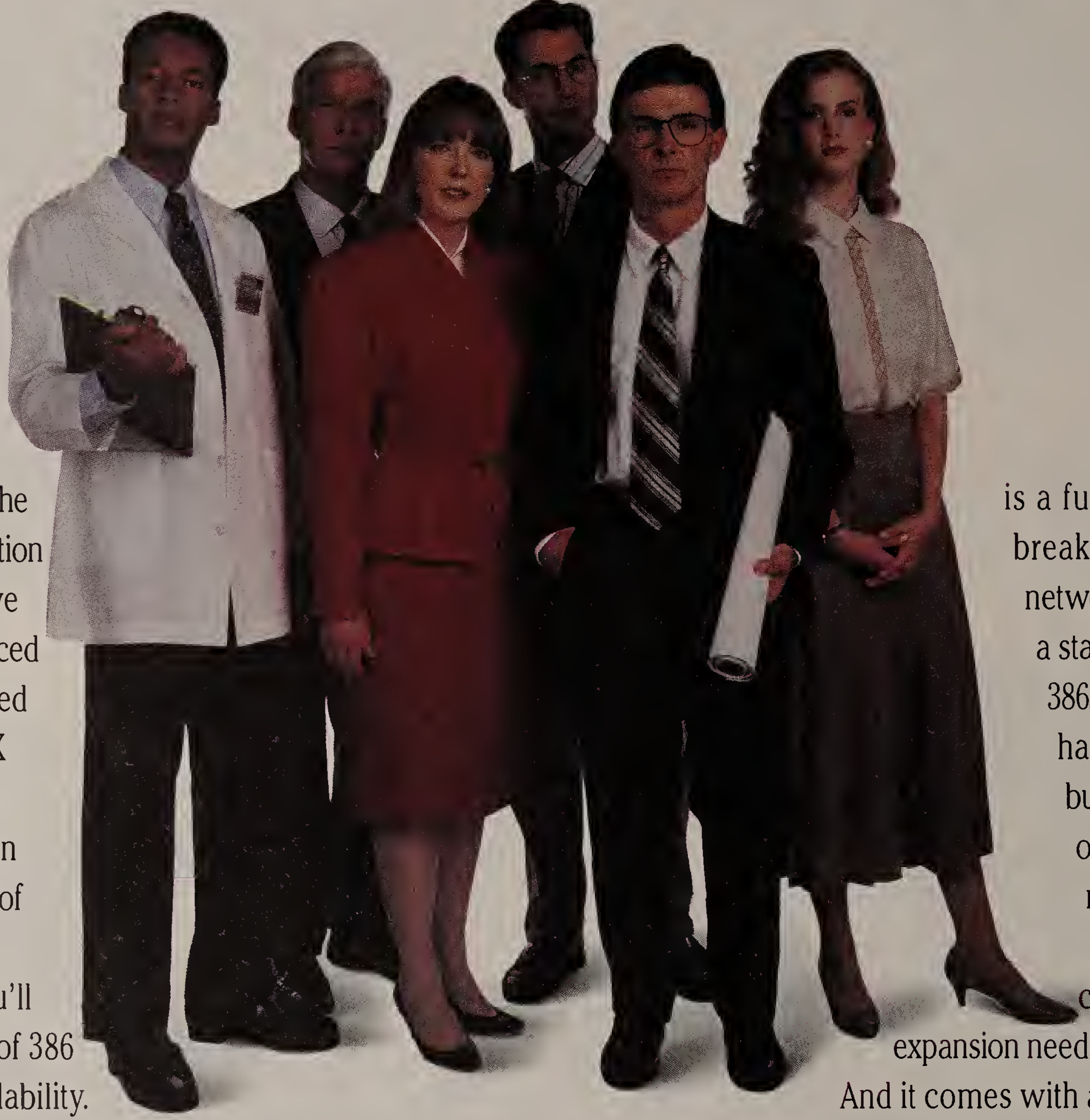


Blum teaches X.400 and X.500 seminars and operates OSI Migrations, a consulting company in Takoma Park, Md.

Before making the transition to X.400, users should evaluate the standard's capabilities and their company's needs.

ILLUSTRATION ©1990 GREG BUSKE

What does Compaq give 386 users who expect the moon?



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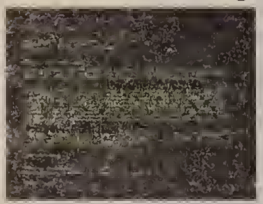
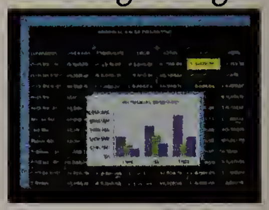


Come look at the COMPAQ DESKPRO 386N Personal Computer, for example. This machine is a full-function PC with breakthrough features for networked environments. As a stand-alone PC, its 16-MHz 386SX microprocessor handles all of the general business applications our other 386SX-based PCs run. With so many integrated features, you can take care of your expansion needs using only two slots. And it comes with a host of unique network features like multilevel security, making it the best full-function personal computer for connected environments. All of this fits neatly into a space-saving design.



The COMPAQ DESKPRO 386S Personal Computer is also designed to handle general business applications. Its 16-MHz 386SX microprocessor gives you exceptional 386 performance. And its 32-bit architecture lets you run today's popular business software. It also offers the flexibility to run tomorrow's advanced business software.

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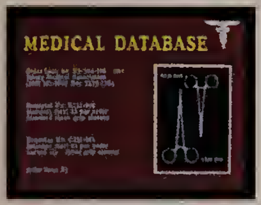
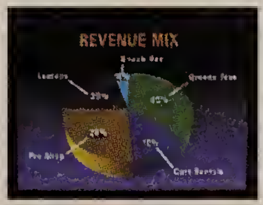
The stars.

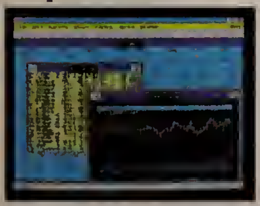
Project managers and other general business users will find everything they need to manage databases and speed through complex spreadsheets in the COMPAQ DESKPRO 386S/20 Personal Computer. It delivers the maximum in 20-MHz 386SX performance and a broad range of integrated features.



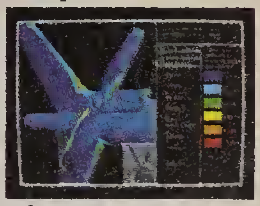
The COMPAQ DESKPRO 386/20e Personal Computer is for experienced users. It's perfect for demanding applications like presentation graphics. And it's loaded with high-performance features like an advanced cache architecture. So it runs up to 50% faster than other 20-MHz, non-cached 386-based PCs.



For users doing similar jobs, but with more stringent performance needs, we offer the COMPAQ DESKPRO 386/25e Personal Computer. Its 25-MHz 32-bit performance lets you fly through financial analysis as well as other demanding applications. It's the perfect personal computer for people who are serious number crunchers, administrators who manage massive loads of information as well as engineers who work on generating complex two-dimensional CAD drawings.



At the most demanding level of 386 computing are the power users who do graphic-intensive applications like 3-D CAD drawings and other performance-intensive applications. These people need the kind of performance that the COMPAQ DESKPRO 386/33L Personal Computer delivers. It combines the fastest 386 microprocessor with high-performance innovations. And it lets you easily upgrade to the power of 486 performance.



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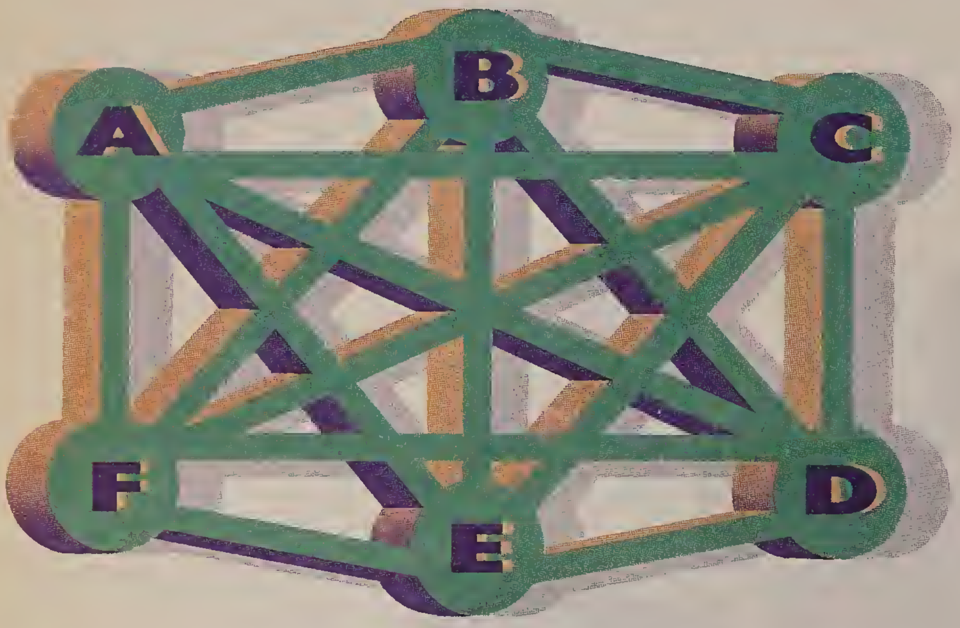
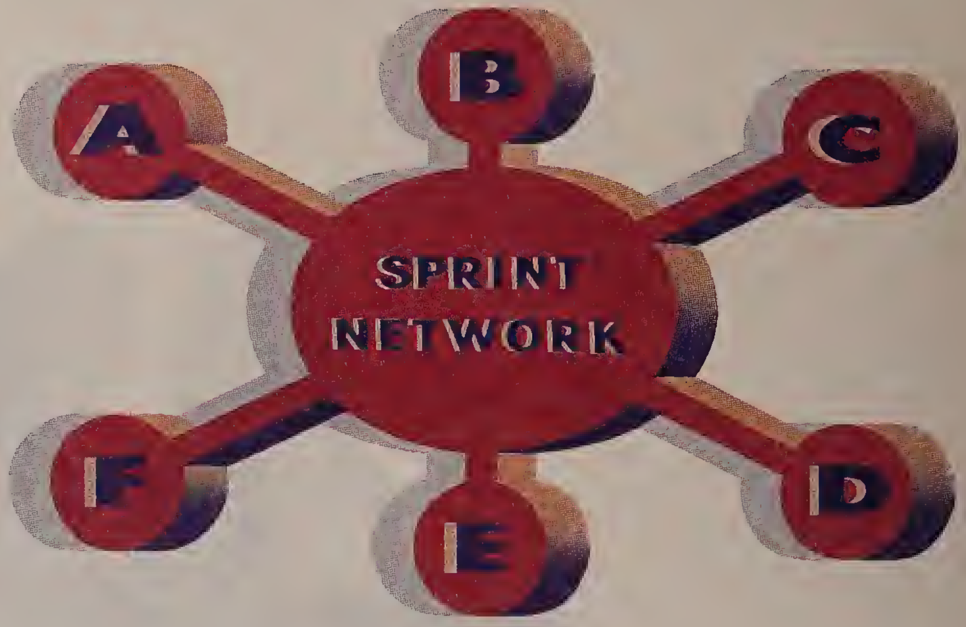
Traditional LAN Internetwork



THESE LANS ARE THEIR LANS.

SprintNet LAN Reach X.25



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UP TILL NOW, the conventional way to build a LAN internetwork was to use private lines. And to connect each LAN to every other LAN or host. The management issues were a nightmare. And the costs were even worse. Which is why most people only connected a few of their LANs. Or none at all.

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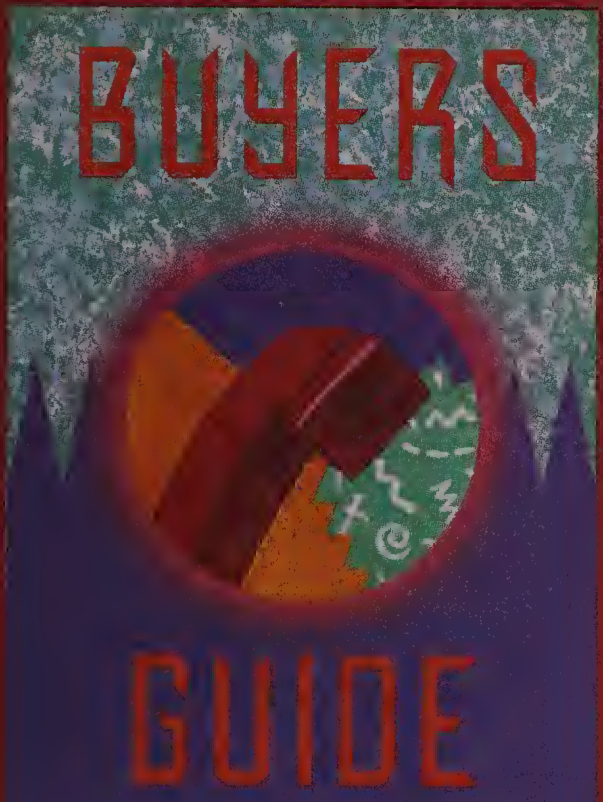

ISDN SERVICES

ISDN in beta test

CONTINUED FROM PAGE 1

one element of their long-term competitive strategy that they will mobilize more fully once ISDN and all of its supporting technologies — including the deployment of Signaling System 7 (SS7) in the local loop — become available nationwide and worldwide.

Many users are secretive about how they are using or planning to use ISDN. Indeed, ISDN is still in what many might call a big beta test, so it's difficult to assign hard numbers to the savings it will produce. In fact, users often bundle ISDN technology with similar or adjunct technologies, such as Centrex, to yield overall system improvements that can mask the specific value of ISDN.

The decision process regarding ISDN implementation is tough. ISDN can require more hardware, software and training at a critical time — when telecommunications budgets nationwide are shrinking.

Briere is president of TeleChoice, Inc., a telecommunications consultancy located in Montclair, N.J., that specializes in long-distance service analysis and network design. He can be reached at (201) 746-0200.

The biggest selling point for installing ISDN continues to be the applications the technology will support. ISDN's most publicized application is automatic number identification (ANI), the ability to determine a calling party's number. Indeed, ANI-related services, such as AT&T's INFO-2, were the first ISDN services carriers introduced.

CHART • GUIDE

A Buyer's Guide chart detailing ISDN offerings from interexchange carriers is on page 64, and a chart comparing RBHC ISDN services is on page 69.

But ANI is not the only ISDN application in town. Indeed, AT&T reports that only 53% of its ISDN users are running ANI-related applications. Among the other major applications users are exploring are:

- **Call-by-call service selection.** Customers can use ISDN Primary Rate Interface (PRI) circuits to concentrate both inbound and outbound traffic at the same location. With non-ISDN T-1 circuits, users

(continued on page 56)

While ISDN standards and applications continue to evolve, users are taking a cautious approach toward the technology.

Looks like everyone is still

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(continued from page 53)

must allocate specific channels to particular services, which leaves large amounts of unused bandwidth capacity when those particular services are not in use.

And with T-1 circuits, changing the bandwidth assigned to any particular service can take days and requires the use of network management systems. ISDN call-by-call service selection gives the user dynamic control of circuits. This could be used by customers to manage the varying traffic loads of several services that previously required dedicated channels.

Call-by-call service selection can save users more than 30% in channel costs due to more efficient channel utilization.

- **Switched digital services.** As with call-by-call service selection, ISDN offers sizable amounts of bandwidth for data transmission needs. Such ISDN precursors as on-demand 56K bit/sec services and the 64K bit/sec service used as the basic ISDN data rate are becoming commonly available in the U.S. and internationally. Service rates of 384K and 1.544M bit/sec, the H0 and H11 options of ISDN, are emerging. AT&T has already announced the H0 option, and H11 is expected early next year.
- **Public networking features.** Traditionally, users that wanted the same private branch exchange station features at every location had to install a private network. The public network wasn't capable of sending such feature-related information as calling station number or name. Use of ISDN signaling between PBXs or Centrex services offers the promise of feature transportability among user sites.
- **Outbound station ID.** Users with T-1 access to long-distance carriers' nodal services must rely on internal station message detail recording (SMDR) equipment to provide internal call accounting. Call information on bills usually only identifies the originating circuit, not the station address. With ISDN, users can receive station-level billing, making the internal bill-back process easier.

PRI's advantages

In addition to the above services, switched ISDN can easily provide a wide range of backup services for private networks, including voice, data and local-area network interconnection.

For example, in comparison with simple T-1 spans, ISDN PRIs can be used economically for:

- **Network restoral.** If a point-to-point private line goes down, users must implement disaster recovery plans that often involve expensive secondary backup circuits. ISDN PRI uses the redundancy of the public switched telephone network for transmission. The PRI D channel routes the individual B channels to their alternate destinations automatically.
- **Peak traffic handling.** For users with high peaks in traffic volume, the flexibility of ISDN PRI can save significant sums of money over dedicated facilities. Given the dynamic nature of ISDN for bandwidth on demand, users can purchase PRI access into ISDN and dial up the services on a call-by-call basis.

Basic Rate Interface (BRI) applications are related to PRI services but can differ fundamentally. BRI services are typically part of digital Centrex offerings. As such, they are predominantly used for voice applications. There is a growing emphasis, however, on data applications.

"One year ago, our customers were looking at 20 to 30 major [ISDN] basic voice applications and four to five major data applications," says Frank Shaffer, data products marketing manager for Bell Atlantic Corp. "Today, however, there are more than 40 applications for both circuit- and packet-switched data."

ISDN enriches features

AT&T's alternate destination call redirection option provides an excellent example of how ISDN can augment existing features to increase efficiency.

Here's what it can do with an inbound call to a telemarketing center. While there may be available lines to the center, all operator stations may be busy. If the center uses T-1 lines, the private branch exchange could receive the call and redirect it over an outbound facility to another location where operators are available.

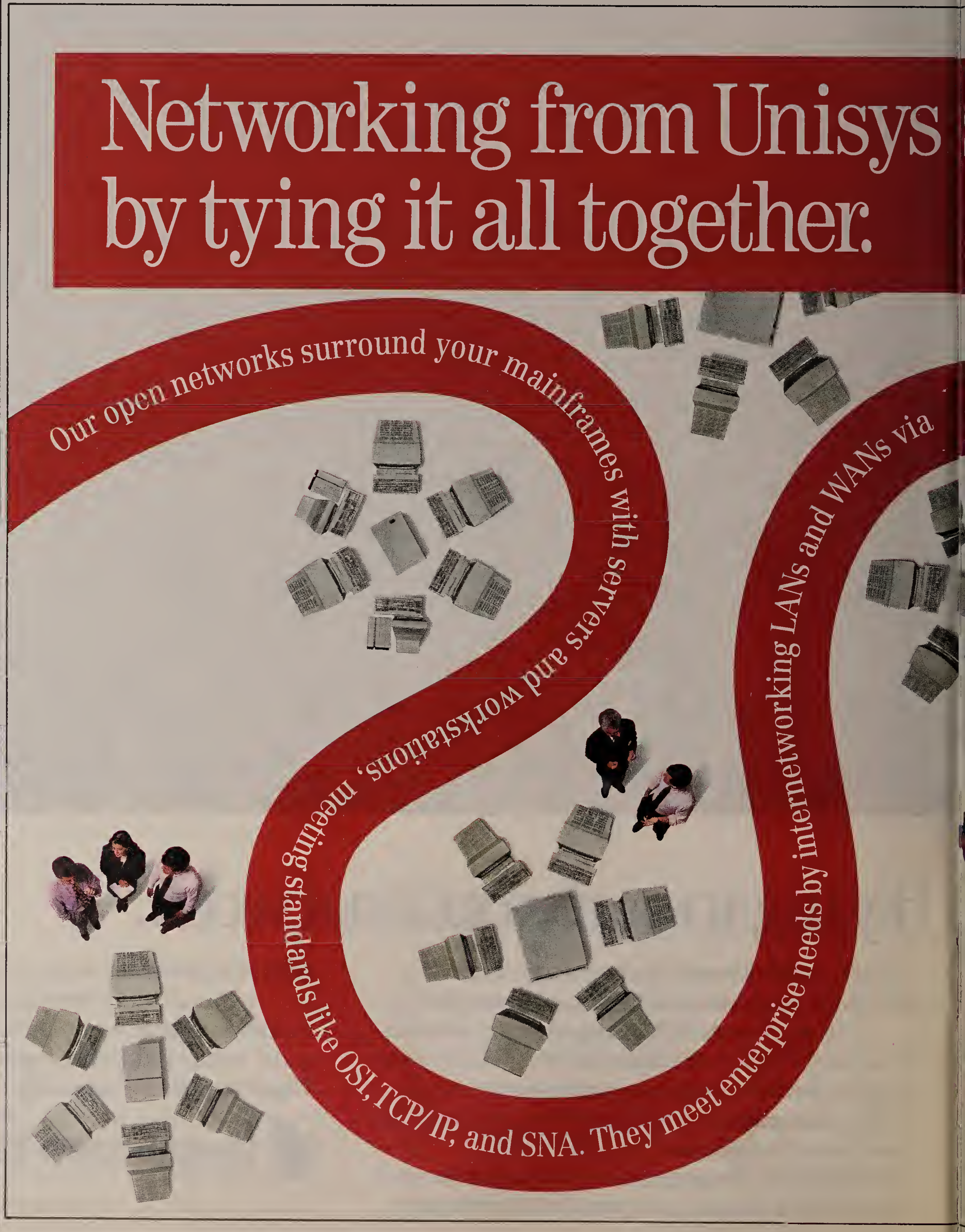
Doing this, however, would cause the call to carry the outbound T-1's automatic number identification (ANI) signature as the originating number, and it would tie up two trunk facilities for a single call.

With Integrated Services Digital Network, the Primary Rate Interface would use out-of-band signaling to send the call to another location. The call doesn't come into the PBX and exit through another circuit; it is rerouted by the carrier. The call also retains its original ANI information.

Other features are also helpful. In instances in which the D channel is signaling for more than one set of B channels, the user is much more exposed to failure on that single D channel than with multiple T-1 links operating independently.

With D-channel backup, a new ISDN feature AT&T has devised, a preprovisioned hot spare D channel covers for a downed D channel in an emergency. MCI Communications Corp. and US Sprint Communications Co. are readying similar products.

— Daniel Briere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Granted, the operation of many of these data applications over ISDN is fairly limited at this time. ISDN speeds are lower than those available with local-area networks, and prices are high for the few interoperable desktop ISDN data products on the market.

ISDN experts at the regional Bell holding companies admit, however, that ISDN is currently only being used for low-tech data applications. Many are simply digital versions of the 9.6K bit/sec dial-up data applications transmitted by dial modems.

Inherent incompatibilities

The growth of ISDN has been hindered by nonuniversal access, or service "islands." Incompatibilities exist in three basic areas:

- **The interexchange carrier-to-local exchange carrier interface.** The interexchange carriers have been pushing PRI services because most of their ISDN customers are high-volume users, dictating the need for the 23 channels offered by PRI access. The local exchange carriers, on the other hand, have sold mostly BRI services, partly because they have tied ISDN to Centrex marketing programs. These are generally targeted at smaller companies, although larger companies often use Centrex as well.

This leaves the two groups of carriers in a predicament. How can the local exchange carriers link their BRI ISDN services with the interexchange carriers' PRI services?

Most BRI-originated calls are sent on to interexchange carrier switches as standard Feature Group D equal access calls. All ISDN-related information ends at the local exchange carrier's central office switch.

In an ideal world, the connection between local exchange carriers' central office switches and long-haul carriers' points of presence should be through SS7. Unfortunately, SS7 is not due to be installed in local networks until at least 1993, although SS7 trials are currently under way.

- **Local exchange carrier-to-local exchange carrier interface.** At least three vendors — AT&T, Northern Telecom, Inc. and Siemens Information Systems, Inc. — make ISDN switches that have been installed in the local exchange carrier network. But unfortunately, for various reasons, all are innately incompatible with one another for passing ISDN-related information. This incompatibility is significant for users that want to install wide-area ISDN systems using local exchange carrier Centrex offerings ("Top ISDN switches lack mutual compatibility," *NW*, June 4).
- **Local exchange carrier-to-customer premises equipment interface.** The manufacturers of customer premises equipment are perhaps the slowest to start complying with standards. In general, users can't take equipment that interfaces with one ISDN Centrex switch and use it on another. This limits the functionality of ISDN and is yet another reason for user wariness.

Removing the barriers

While some in the marketplace are predicting difficulties based on these seemingly irreconcilable differences, customer premises equipment vendors and carriers recognize the future of ISDN and are working slowly to remove some of these barriers. Compliance with Bell Communications Research standards and technical reports is crucial to ISDN's success.

Unfortunately, vendors don't want to spend massive amounts for standards development until the market for ISDN develops. The carriers can't push for extensive expansion of their networks due to lack of compatible customer premises equipment and local network support. In the meantime, many users perceive a lack of commitment throughout the telecommunications industry and refrain from investing in ISDN equipment. (A Buyer's Guide to ISDN customer premises equipment is scheduled for the Nov. 19 issue of *Network World*.)

Incompatibility problems with central office switches will be ameliorated later this year when AT&T and Northern Telecom modify their switching software: Version BCS31 for Northern Telecom's DMS-100 and Version 5E6 for AT&T's 5ESS. In fact, after these adjustments, ISDN Centrex customers with different central office switches will be able to intercommunicate on an end-to-end basis for the first time.

However, the degree of transportability will be limited. Bell Atlantic's Shaffer predicts that until late 1991 or early 1992, there will not be a high enough percentage of compliance between AT&T's 5ESS and Northern Telecom's DMS-100 to make customer premises equipment truly portable from a location served by one Centrex switch to that served by another.

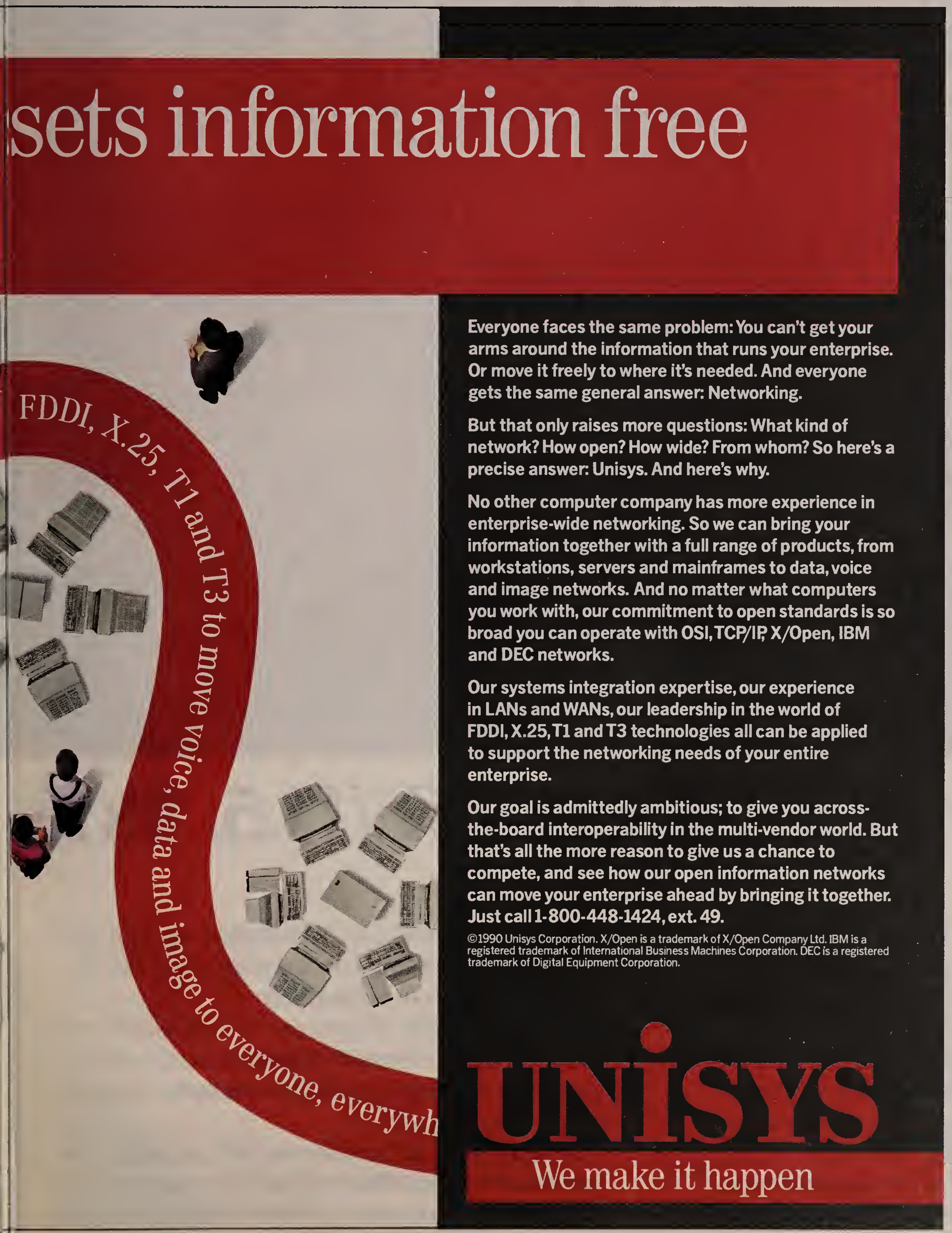
Users are finding ways around these compatibility problems with the help of carriers and vendors. A milestone ISDN trial occurred in May of this year, when Ameritech, BellSouth Corp. and MCI Communications Corp. teamed with Fujitsu America, Inc. and PictureTel Corp. to provide Mellon Bank in Pittsburgh with the nation's first ISDN videoconference using public network connections to link cities served by different regional telephone companies.

This was the first trial of ISDN crossing the operating territories of all the different carriers.

AT&T's charming PRINCE

AT&T recently announced a service called Primary Rate Interface Nodal/Centrex Express (PRINCE) that extends its 4ESS-based ISDN network to 5ESS Centrex switches. It will be available when the local switches have been equipped with AT&T's latest 5ESS software, the 5E6 generic.

(continued on page 64)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(continued from page 48)

And with the 1988 security extensions supporting encryption and digital signatures, X.400 is evolving into an industrial-strength bearer service for applications requiring near-military grades of security.

Test-driving X.400

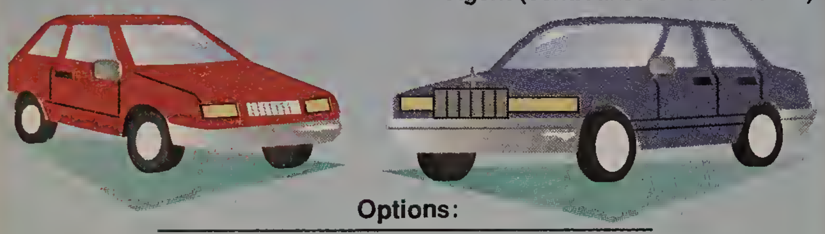
Figure 1

Economy model (based on a 1984 version of X.400)

- Message relay via Message Transfer Agent
- User access via User Agent
- Basic E-mail support (no message retrieval)

Luxury model (based on a 1988 version of X.400)

- Message retrieval, scanning, listing and forwarding via Message Store
- Access other users' directories via X.500 Directory User Agent
- Maintain name-to-address lists via X.500 Directory System Agent (centralized or distributed)



Options:

- Fax access unit
- Telex access unit
- Teletext access unit

1984 X.400

- Secure messaging
- Physical delivery access unit

1988 X.400

- EDI support — 1990 CCITT F.435 and X.435

GRAPHIC BY SUSAN SLATER

SOURCE: OSI MIGRATIONS, TAKOMA PARK, MD.

X.400 provides a complex store-and-forward architecture that is not well-suited for real-time messaging applications. Also, the protocol's rich array of features requires a voluminous envelope, or message header. This makes X.400 unsuitable for bandwidth-limited applications.

Shopping for X.400

Enterprises for which X.400 is a good fit should first determine their goals.

What kind of network are they moving toward? Do they want to completely replace existing networks with a native X.400-compliant messaging system? Or will it suffice to have indirect access to the X.400 user community through a gateway, such as Retix's local-area network-based Open Server 400 product?

> Nowhere is the standards time lag more apparent than in the progress toward certification of conformance.

▲▲▲

Some user organizations can satisfy their requirements simply by subscribing to a public messaging service that supports X.400, such as AT&T Mail and MCI Communications Corp.'s MCI Mail.

Users evaluating products or specifying requirements for requests for proposal will find that X.400 offers several options. Many of these features were developed in the 1984 version of the standard and are available today. Others were developed in the 1988 version and are not yet ready (see Figure 1, this page).

A minimal, low-risk X.400 system based on the 1984 standards can be purchased from many software providers and most system vendors. This economy model contains a Message Transfer Agent (MTA) for message relay and a User Agent for user access. It supports basic E-mail without sophisticated message retrieval features, electronic data interchange or security and is widely available on the market.

By contrast, an X.400 luxury model is based on the 1988 X.400 standards and offers many more options. One option that provides maximum functionality is Message Store. Custom-designed for personal computer or LAN users, Message Store standardizes sophisticated message retrieval, alerting, forwarding, scanning and searching protocols.

For maximum interoperability, users should specify support for the 1988 MTA "P1" relay protocol and support for the downgrading procedures offering backward compatibility to 1984 vintage MTAs as well.

Since multivendor E-mail can be very difficult to use without a good multivendor directory, users should also consider implementing X.500 as part of the luxury model configuration.

Users should specify at least one Directory User Agent, which can, as a client, access directories maintained by other users. In addition, users can trade up to a Directory System Agent (DSA), which can operate as a server, allowing enterprises to maintain their own name-to-address lists and sell access to outside users.

There are two kinds of DSAs: centralized and distributed. A distributed DSA can communicate with peer DSAs, while a centralized DSA cannot. Many DSAs available today are centralized, offering little more than a migration path to full X.500.

Currently, the full luxury model of X.400 is difficult to buy off the shelf. However, selection is expected to improve markedly over the next two years.

Options for the impatient

For buyers who cannot afford to wait, Retix currently offers a portable X.500 Directory product, which has been ported by a number of vendors, including NCR Corp. Retix has a portable Message Store in prerelease, which has been sent to a number of OEM vendors and should be formally released by year end.

Unisys Corp. recently announced X.500 pricing and availability, and Digital Equipment Corp. has announced plans to release X.500 next year. TITN, Inc., a portable X.400 software vendor, offers Message Store; OSIware, Inc.'s Messager 400 product has both the Message Store and the X.500 Directory.

The current early availability of X.400 and X.500 products is significant because once a few software firms provide the first implementations, many other vendors will then base their products on source code licensed from the initial implementors.

Some user enterprises, such as banks and military defense operations, require even more. They need "deluxe a la carte options," such as secure messaging, physical (postal) delivery of messages and EDI support.

Many industries are eyeing the new CCITT F.435 and X.435 recommendations for running EDI over X.400, which are expected to be adopted by year end. However, most of the deluxe options are not likely to be widely available for three to five years because of their complexity and the need for further industry agreement on interoperability details.

X.400 operational concerns

Figure 2

Some factors to consider in X.400 transition

- ☐ Network connectivity (connectionless vs. connection-oriented protocols)
- ☐ Network management (CMIP support)
- ☐ Performance (throughput and response time)
- ☐ Billing (administrative domain vs. private domain)
- ☐ Security
- ☐ Expandability
- ☐ User interface

CMIP = Common Management Information Protocol

SOURCE: OSI MIGRATIONS, TAKOMA PARK, MD.
GRAPHIC BY SUSAN SLATER

When specifying 1984 X.400 standards compliance, users should reference the National Institute of Standards and Technology (NIST) OSI Implementor's Workshop Stable Agreements on X.400 and GOSIP Version I for generic material. And they should spell out other requirements that are unique to their specific procurement.

RFP writing becomes slightly more problematic when specifying the luxury or deluxe X.400 models. This is due to the time lag between the publication of the 1988 CCITT/International Standards Organization base standards and their clarification by industry agreements.

GOSIP Version III is supposed to contain 1988 X.400 and X.500, but it will not be issued until at least 1992. The December 1989 NIST Agreements are not complete, but users can try to get vendors to pledge support for the next set of agreements, which are scheduled to be published in December.

Nowhere is the standards time lag more apparent than in the progress toward certification of standards conformance. A formal system for certifying the 1984 version of X.400, not to mention the 1988 version, is still not in place. Because making certification a precondition for X.400 product acceptance and payment puts teeth into contracts, planners should look seriously at

(continued on page 63)

The art of gateway construction

X.400 gateways convert messages in a non-X.400 format to an X.400 format and vice versa. Message fields such as "Subject" and "Originator" map straight through between the formats.

However, other options that are not as frequently used — such as X.400's Blind Copy Recipient — may be lost when an X.400 message is reformatted into a non-X.400 message format that does not support blind copy.

Users should be able to reply to messages from either side of the gateway. Message recipients should be able to identify message originators and other recipients. Other X.400 features, such as Priority Indicator, should be defaulted intelligently by the gateway, and network management personnel should be able to reconfigure them.

The accompanying figure shows the way in which a gateway would convert a message from a hypothetical non-X.400 format to X.400. Note the field mappings between the ABC Message fields and the X.400 Content and Envelope fields.

Some field translations, such as ABC Message Identifier-to-Interpersonal Message Identifier, are simple copies. Others, such as ABC Priority (with five levels) to X.400 Priority (three levels), require more complex semantic mappings. Also, message size and character set constraints imposed by the non-X.400 protocol must be respected.

X.400 message conversion

ABC Message (non-X.400 format)	X.400 Message Content
Addressee	Recipient
Message Origin	Originator
Message Identifier	Interpersonal Messaging Identifier
Special Service Address	Reply-to-User
Body of text	International Alphabet 5 text body part
Signature	Authorizing User
	X.400 Envelope
ABC Priority (5 levels)	Priority (3 levels)

A gateway converts a non-X.400 message into X.400 by mapping the message fields between the two formats.

GRAPHIC BY SUSAN SLATER

SOURCE: OSI MIGRATIONS, TAKOMA PARK, MD.

Originator/recipient mapping, as in ABC Addressee-to-X.400 Recipient, usually requires the use of X.400's Domain Defined Attributes (DDA). DDAs allow non-X.400 addressing information of arbitrary formats to be included as part of an X.400 Originator/Recipient Name.

When specifying the software architecture of a gateway, planners should require that the application program interface (API) produced by the X.400 API Association and X/Open Company, Ltd. be included. Gateways built using the X.400 API can, in theory, plug and play with any off-the-shelf X.400 system that supports it.

— *Daniel Blum*

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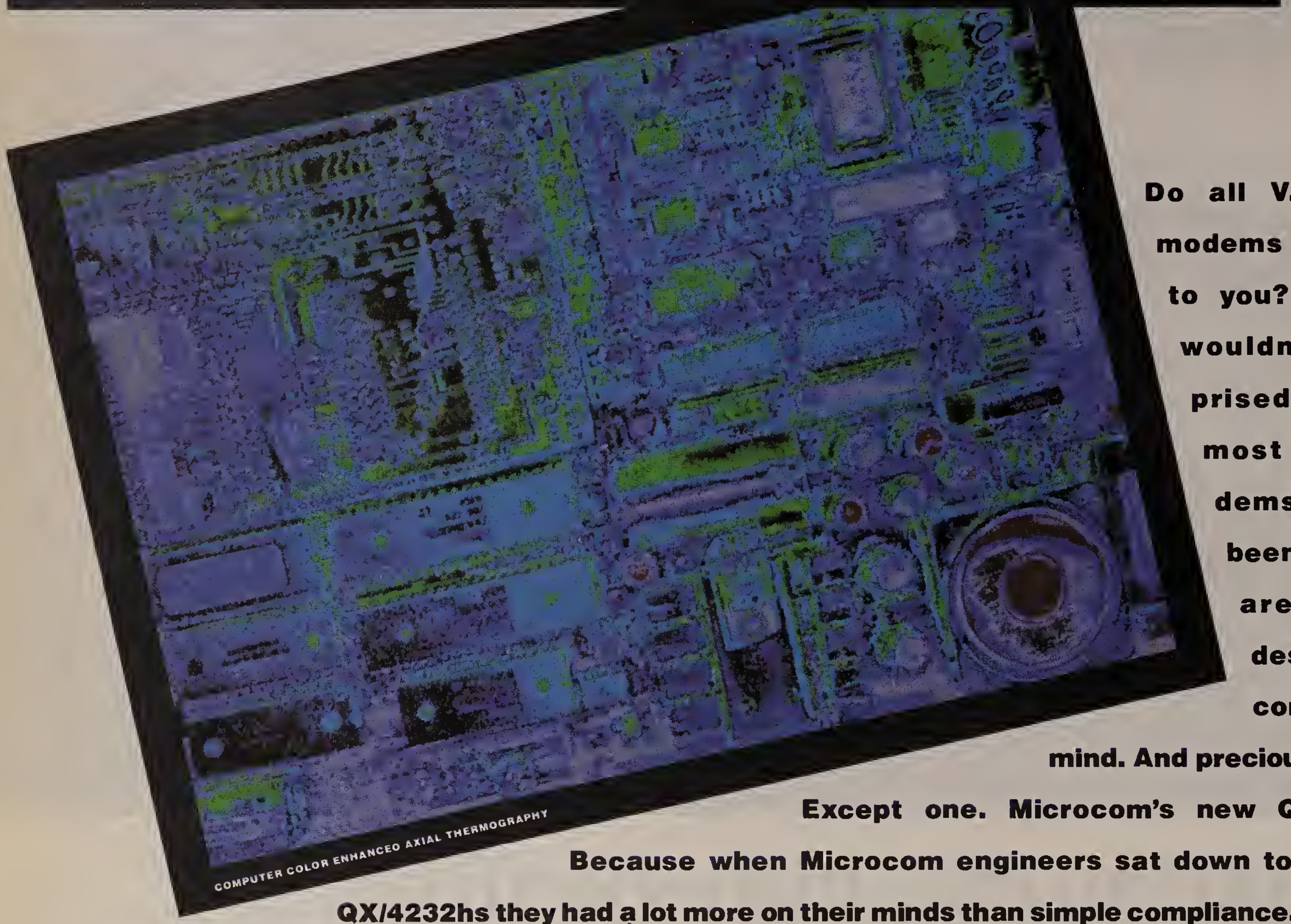

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X.400 migration strategies

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GOSIP's certification procedures once they are available.

Interested parties can purchase the texts of GOSIP Version I and the NIST Stable Agreement through the National Technical Information Service by calling (703) 487-4650.

Parties can purchase a quarterly subscription to the changed pages of the NIST Agreements through the Government Printing Office by calling (202) 783-3238. The stock number is 903-015-00000-4.

> The most difficult choices in migration do not always involve the technical aspects of X.400.
>
> ▲▲▲

In addition to standards compliance and certification requirements, operational concerns regarding network-layer connectivity, network management, performance and billing are very much a part of both X.400 migration and procurement planning (see Figure 2, page 60).

In a move widely emulated throughout various industries in the U.S., GOSIP has specified the ISO 8473 Internet Protocol. IP is a connectionless, subnetwork-independent convergence protocol designed to operate over X.25, IEEE LAN protocols, Integrated Services Digital Networks or any subnetwork.

However, connection-oriented X.400 protocol suites implementing X.25 without IP remain prevalent, particularly in the European market.

In specifying the lower communications-layer connectivity options for supporting an X.400 implementation, planners need to decide whether to require connectionless IP, connection-oriented X.25 or both.

An X.400-based E-mail system requires management software to control diverse elements such as MTA routing tables, X.500 DSA routing tables and data bases, gateway mailboxes and any data bases supporting Message Store. Day-to-day management operations include monitoring performance and user storage, creating and deleting user accounts, changing passwords and setting access control criteria.

Ideally, the management component of an X.400 product would act as an agent to an integrated network management center using OSI net management protocols based on the Common Management Information Protocol (CMIP). However, the full set of standards for OSI network management will not be mature for several years, and only then will MHS management agent standards begin to crystallize.

In the interim, users can ask vendors about their schedules for supporting CMIP and ensure that any MHS management tools and procedures they buy support the operational requirements for running an X.400 service.

Performance concerns must not be overlooked. The throughput capacity of an E-mail system should be expressed in terms of the total number of supported users, the expected number of sessions per user, the average time spent logged into local User Agent interfaces and the number and size of messages sent.

Response time

Response time requirements may be posed in seconds, minutes or even hours, depending on a message's Priority Indicator. If X.400 is to be used for conversational or conferencing applications, stringent criteria should be set for messages of "urgent" priority (see "The art of gateway construction," page 60).

Because users will access both the Message Store and the X.500 Directory interactively, there should be little or no perceptible delay between when the user issues a request and when the response information begins printing on the display device.

For local X.500 Directory lookups and Message Store retrievals of less than 30 entries, stringent throughput criteria should be set. The priority of Directory lookups (high, medium and low) should be set by the software to reflect the absence or presence of an end user interacting with the software.

Billing must not be forgotten. Make sure your vendor's logs contain the necessary information for reconciliation of network, gateway, X.400 and X.500 events. Determine if reverse charging on a per-message or per-recipient basis is needed or supported.

The fact that some messaging systems operate as administrative domains and others operate as private domains also has billing ramifications. MTAs belonging to administrative domains are allowed to carry internationally tariffed messages and, in return, are subject to special billing and accounting regulations specified by the International Administrative Domain Operators Group.

Difficult choices

The most difficult choices in X.400 migration do not always involve the technical aspects of X.400. Instead, they often deal with business decisions such as determining the operational concerns, how quickly the transition should occur and how long the old service should be kept on-line (see "Hammering out a plan," this page).

When specifying the technical aspects of X.400, users have a standard to work from, Implementors Agreements to reference and interoperable messaging products on the shelf. With GOSIP in place and the number of connected X.400 public messaging services and subscribers growing, the X.400 standard is no longer a future agenda item but a practical benefit that users can take advantage of today.

Hammering out a plan

An inescapable aspect of X.400 transition planning is what to do about the old system and its entrenched users. While the market demands modernization, current users demand backward compatibility. It takes adroit maneuvering to satisfy both camps.

If mishandled, an X.400 transition could throw a company into organizational turmoil and drive away its customers.

To make certain this doesn't happen, the first step in an X.400 transition must be to obtain top management's unequivocal support. Next, begin team building. The transition requirements evaluation process should involve not only marketing personnel and system engineers, but also key users, product operations personnel and other workers who will be affected.

One user who went through an X.400 migration two years ago sums up the task as one of balancing different interests. "It's not an easy process to balance technical and business concerns, to weigh proprietary against standard architectures and to interconnect different islands of information to form a messaging backbone," says Judy Rosall, telecommunications consultant for the corporate electronic mail backbone network project at Bank of Boston Corp.

There are many issues to consider. Some transitions involve a quick cutover; others involve running the old and new services in parallel. In the latter case, gateways may be built to give users continued access to the old service.

First, network planners should perform cost/benefit analyses to determine whether the gateway should be built at all. If the results are encouraging, planners should survey users to define the key functionality of the old system that must be preserved through the gateway. Once deployed, a gateway may ultimately be phased out through service or pricing incentives.

— Daniel Blum

Planning for X.400

Before making the transition to X.400:

- ☑ **Get upper management's support.**
- ☑ **Build an evaluation team.**
- ☑ **Determine user needs.**
- ☑ **Perform a cost/benefit analysis (running old and new systems in parallel vs. a quick cutover).**

GRAPHIC BY SUSAN SLATER

SOURCE: OSI MIGRATIONS, TAKOMA PARK, MD.

Letters

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request for recommendation or the more formal RFP requires the clear understanding and definition of functional needs.

A good RFP should avoid detailed specifications that restrict how a vendor will meet the defined need and should offer the opportunity for varying technical solutions.

To shorten the acquisition cycle, the RFP writer must have the information resources at hand to immediately identify the best vendor candidates.

Therefore, this solution to RFP limitations lies in the knowledge and know-how of the RFP writer rather than in abandoning the RFP for some less defined and perhaps hazardous purchasing procedure.

John Bruck
Director of computer and
systems consulting
Urbach, Kahn & Werlin PC
Albany, N.Y.

Data Packets

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provide complementary host software for attaching its supercomputers to the PS32 switches.

The PS8-8 costs $56,000 and is expected to ship later this year. The PS32 switches are scheduled to ship in the second half of 1991. They are priced on a special-bid basis.

Frontier Technologies Corp. recently announced an X.400 product for Microsoft Corp.'s Microsoft Windows 3.0 that meets the International Standards Organization's 1988 Message Handling System specifications.

The product, Super-X.400 for Windows 3.0, lets users access any other X.400-based electronic mail package using the graphics-based Microsoft Windows interface. For wide-area connections, the product supports the X.25 protocol and also works with 802.3 Ethernet or 802.5 token-ring local-area networks.

Super-X.400 for Windows, which is compatible with X.400 products based on the 1984 specification, includes a user agent complemented by user application software for composing, sending, forwarding, reading and managing messages. It also includes an X.400 message transfer agent that supports functions such as delivery timing services and message delivery to single and multiple recipients at one or more destinations.

The product is scheduled to ship in the first quarter of 1991. Pricing will be announced during the fourth quarter of this year.

Network Software Associates, Inc. (NSA) last week announced enhanced versions of its AdaptSNA 3270, AdaptSNA APPC and AdaptSNA RJE microcomputer-to-mainframe link software.

Version 4.3 supports a library of link driver software. This enables the three packages to work with a variety of vendors' microcomputer-to-mainframe adapter boards such as Digital Communications Associates, Inc.'s line of Irma boards.

Those boards link a microcomputer via coaxial cable to an IBM cluster controller or convert the microcomputer's asynchronous data stream to IBM Synchronous Data Link Control protocols for transmission over wide-area circuits. NSA also said the new versions of AdaptSNA APPC and AdaptSNA RJE will include support for Novell, Inc.'s Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX) transport protocol, thus enabling the packs to act as a gateway linking NetWare-attached microcomputers to IBM hosts.

Pricing for all three products remains the same. AdaptSNA 3270 is priced at $245 and makes microcomputers appear to hosts as IBM 3278 or 3279 terminals. AdaptSNA APPC, priced at $285, enables microcomputers to use IBM's Advanced Program-to-Program Communications protocol to establish peer-to-peer links with hosts. AdaptSNA RJE, priced at $785, enables the microcomputer to emulate an IBM 3770 Remote Job Entry terminal. Current users covered by NSA's Extended Support Program will be upgraded for free; other users must pay $50 to upgrade.

NETWORK WORLD

Interexchange carrier ISDN offerings

Company	Product name	Type of Interface	Signaling used	Nonassociated D-channel signaling	Services accessed	Service coverage	Installation charges	Monthly charges	Features available	PBXs tested
AT&T Business Communications Services **Basking Ridge, N.J.** **(201) 234-3740**	AT&T ISDN PRI	PRI	Out-of-band	479 nonassociated B channels supported	WATS, 800, 900, virtual network, switched data, private line (1), international services (2)	330 cities (3)	$3,000 per D channel (4)	$400 per D channel	Station ID (5), ANI delivery (6), user-to-user information (5) (7), D-channel backup (8), channel negotiation (5), switched wideband 384K bit/sec (5), call-by-call service selection (5), alternate destination call redirection, static trunk group arrangement (5)	AT&T Definity Generic 2; AT&T Definity Generic 1; Ericsson Information Systems, Inc. MD110 R4; Fujitsu America, Inc. Omni and F9600; Hitachi America, Ltd. HCX5000; InteCom, Inc. DT124; NEC Information Systems, Inc. NEAX2400; Northern Telecom, Inc. Meridian SL-1 and SL-100 (BCS28) (9); Siemens Information Systems, Inc. Saturn IIe
MCI Communications Corp. **Washington, D.C.** **(202) 887-3320**	MCI ISDN	PRI	Out-of-band	479 nonassociated B channels supported	WATS, 800, virtual network	203 cities	$3,000 per D channel (4)	$400 per D channel	Station ID, ANI delivery (10), call-by-call setup (11), trunk group rearrangement (12)	Northern Telecom Meridian SL-1; Rolm Co. 9751-CBX and 9757-CBX (13)
US Sprint Communications Co. **Kansas City, Mo.** **(404) 859-6791**	US Sprint ISDN Primary Rate Service	PRI	Out-of-band	432 nonassociated B channels supported	WATS, 800, virtual network, switched data, private line, international services, meeting channel videoconferencing service	283 POPs	$2,000 per D channel (4)	$300 per D channel	Station ID (14), ANI delivery (15), user-to-user information (7), call-by-call setup (16), trunk group establishment/ rearrangement (17)	AT&T System 85; Fujitsu 9600; Northern Telecom Meridian SL-1 and SL-100; Rockwell International Corp. ISS 3000; Siemens Saturn III

ANI = automatic number identification
POP = point of presence
PRI = Primary Rate Interface

FOOTNOTES:

(1) Inband signaling only.
(2) Services available include: Megacom WATS, Megacom 800, MultiQuest 900, Software-Defined Network, Accunet Switched Digital 56K, 64K and 384K bit/sec services, Software-Defined Data Network, Switched Digital International (56K and 64K bit/sec), Megacom WATS International Add-On, HI-CAP Megacom 800, HI-CAP MultiQuest 900 and Accunet Private Line Service.
(3) AT&T will have service in 350 cities by year end, including 14 4ESS switches. Also, 246 extended POPs are ISDN deployed.
(4) Note that individual services accessed may have an installation charge, but there is no ISDN-related service charge above the typical service installation.
(5) There is no charge for this feature.
(6) This feature has no installation charge but does have a usage fee of 2 cents per delivery for the first 60,000 deliveries per month and 1 cent per delivery thereafter.
(7) User-to-user information is capable of carrying a great deal of information, including calling party name, calling party line and network ring-again.
(8) Standard D-channel fees apply: there is a $3,000 installation charge for this feature, plus a $400 monthly charge.
(9) This product is partially compatible with the listed ISDN service. Only remote testing was conducted.
(10) This feature has a $300 installation charge, plus a usage fee of 1 cent per delivery.
(11) This feature has a $250 installation charge.
(12) This feature has a $200 charge per occurrence.
(13) By year end, MCI expects to have certified the following additional hardware: Northern Telecom DMS-100 and SL-100; AT&T System 85 - Definity G1 and G2; Aspect Telecommunications Corp. ACD, Rockwell Galaxy; Siemens Saturn; and Teleos Communications, Inc. IAP 6000.
(14) This feature has a $100 installation charge and is available only to US Sprint Virtual Private Network customers with Northern Telecom SL-1 PBXs.
(15) This feature has a $200 installation charge, plus a usage fee of 1 cent per delivery. The 1 cent delivery fee is currently waived.
(16) US Sprint has dropped the $250 installation charge for this feature.
(17) There is a $250 installation charge to establish a new trunk group and $200 per occurrence for rearranging trunk groups.

This chart includes a representative selection of interexchange carrier ISDN offerings.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

(continued from page 57)

PRINCE allows users to have dedicated ISDN connections between the local exchange carrier and interexchange carrier switches. Without this service, ISDN PRI service could be obtained only by direct, dedicated circuits between the customer and an AT&T 4ESS tandem switch.

In addition, prior to the development of PRINCE, BRI customers couldn't receive PRI features as provided by the long-distance network. With PRINCE, customers can use any form of access "behind" a Centrex switch to complete a connection to AT&T's or any complying carrier's network, including BRI, PRI and local business lines.

Users can bridge ISDN islands by connecting local exchange carrier BRI B channels to an AT&T PRI service, which in turn will link up to another carrier's BRI service via PRINCE. Thus, with PRINCE, Centrex users served by a 5ESS switch can get end-to-end PRI access.

Among the features AT&T offers through PRINCE are INFO-2, call-by-call service selection and alternate destination call redirection (see "ISDN enhances features," page 56).

Using PRI access with the nodal services of the long-haul carriers instead of a T-1 link can have advantages. For example, by combining virtual network services with PRINCE, users can pass the calling number field information to the interexchange carrier for storage in the billing record. Then at the end of the month, the carrier can generate station-level call detail. Previously, that service was available only to Centrex users or to users with their own SMDR equipment.

The PRINCE capability is not unique to AT&T. MCI, for example, plans to begin similar end-to-end PRI services through local carrier ISDN capabilities for its larger customers by the end of 1990. US Sprint hopes to bypass many of these compatibility problems via strategic equipment alliances with other vendors.

Application roadblocks

In the end, applications will dictate how fast U.S. telecommunications decision makers accept ISDN. Unfortunately, some innovative ISDN applications are running into previously unforeseen roadblocks.

For example, many users in the medical profession are quite interested in using ISDN circuits as a way of transmitting X-rays between medical offices. However, the insurance industry is raising liability issues, such as the likelihood of a transmission error causing a misrepresentation of the X-ray and a misdiagnosis. Thus, potential legal ramifications could limit the extent of ISDN use in the medical profession.

The legal issues of privacy also put parameters around what the technology can do. Some ISDN product managers have said that states in which the ANI issue was being debated heavily were being bypassed during the first go-around.

"Why take a chance?" asks one product manager who requested anonymity. "We'll just wait to see if the ANI issue has an effect before committing ourselves." An example is Bell Atlantic, which is passing up Pennsylvania and Virginia because those states do not allow caller ID.

Efforts by AT&T and other carriers to link their ISDN services with local counterparts are commendable, but they must be viewed cautiously. Complete

(continued on page 69)

A glossary of ISDN features

The following is a glossary of selected Integrated Services Digital Network features:

Circuit-switched voice

- **Call review** displays call-related information about any active call. Information includes call appearance identification, called or calling directory number and incoming call type.
- **ISDN intercom** allows customers to use one-digit dialing for a selected group of users.

Packet data

- **Single logical channel** allows ISDN subscribers to specify a logical channel to be used only for calls that they originate.
- **Fast select initiate/accept** allows a sending data terminal to forward as many as 128 bytes of data along with call setup and clearing packets. Fast select acceptance allows the switch to transmit incoming call packets with the fast select facility to a destination terminal that has this feature.
- **Flow control parameter negotiation** allows negotiation of flow control parameters on a per-call basis. This consists of automatically negotiating the maximum packet size and window size for each direction of data transmission.
- **Throughput class negotiation** allows the calling data terminal to request specific throughput classes in the call request packet for both directions of data transmission.

Circuit-switched data

- **Semirestricted (originating and terminating) lines.** Users on these lines can make calls to and receive calls from lines within the same terminal group, including the attendant, and calls over private facilities (if they are within the terminal group). Restricted calls are routed to an announcement or forwarded to another station.
- **Fully restricted (originating and terminating) lines.** This is similar to semirestricted service, but calls to and from the attendant are restricted.
- **Circuit-switched data call hunting** allows the end user to dial a single number to access a port on the host in a circuit-switched implementation of multiple Basic Rate Interface (BRI) access to a host. This feature can hunt on individual BRI lines for circuit-switched ISDN data calls.

Optional

- **Packet closed user groups** allow ISDN subscribers to establish subnetworks within which the members of the closed user group can communicate. Communications with users that are outside the closed user group is not permitted.
- **Extended ISDN (remote) service** provides the ability to deliver ISDN U interface access in groups of eight lines using BRI transmission extension cards and AT&T's HI-CAP service.

— Daniel Briere

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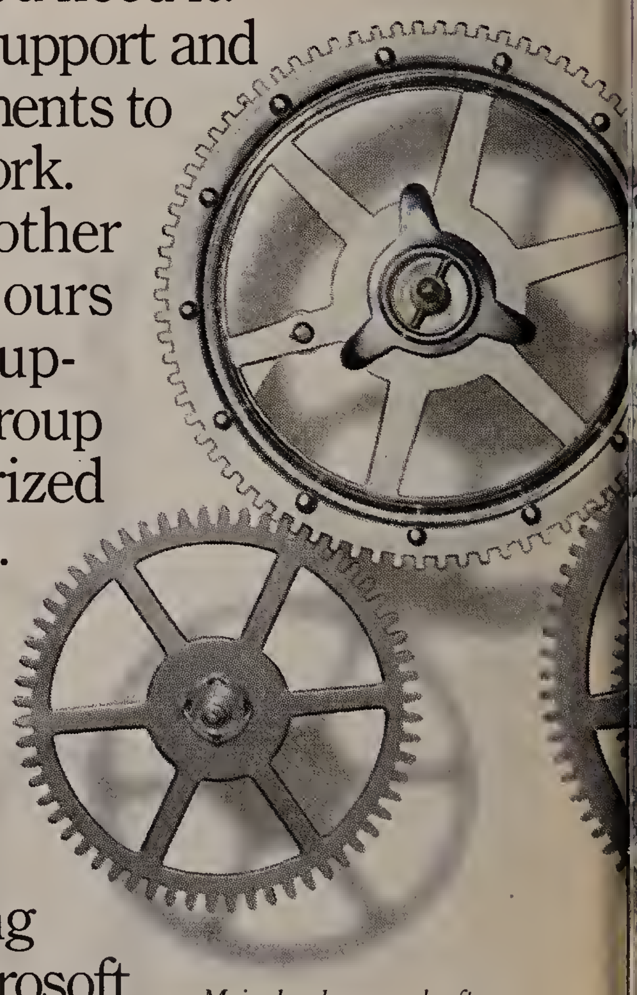

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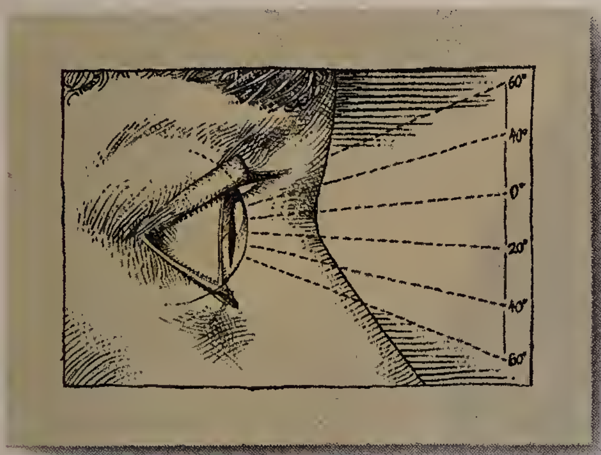
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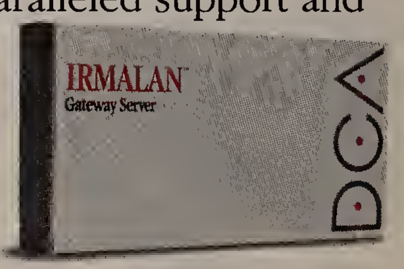

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See The FAXNeT Form on Page 85

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NETWORK WORLD

Regional Bell holding company ISDN offerings

Company	Product name	Availability	Type of interface	Coverage	Installation charges	Monthly charges	Circuit-switched voice features	Circuit-switched data features	Packet-switched data features	Optional features	Other features
Ameritech Services, Inc. Chicago (800) 242-8580	Ameritech ISDN Centrex	Centrex customers only	BRI	46 cities	Service: $50 (1); line: $70.50; D-channel: $50; B-channel packet: $3,000	Service: $9 for voice, $9.85 for circuit-switched data; line: $11.17 (2); D-channel: $9.25; B-channel packet: $87.25	Incoming call line identification (intercom only); outgoing call line identification (intercom only); time and date display; call review; ISDN intercom; multiple directory number; shared directory number; privacy; calling number ID block	Speed calling; semi-restricted (originating and terminating calls); fully restricted (originating and terminating calls); intercom dialing; circuit-switched data call hunting	Single logical channel; fast select initiate/accept; flow control parameter negotiation; throughput class negotiation; incoming calls barred; outgoing calls barred	Additional packet logical channels; permanent virtual circuits; packet closed user groups; electronic directory interface; extended ISDN service (remote)	All Centrex line and system features are available to Ameritech ISDN Centrex customers
	Ameritech ISDN Direct	Business line customers only	BRI	46 cities	Service: $0 (3); line: $20.50; D-channel: $0; B-channel packet: $100	Service: $3 for voice; circuit-switched data: $8; line: $13.09 (2); D-channel: $6.50; B-channel packet: $88.70	Time and date display; call review; multiple directory number; shared directory number; privacy	Speed calling; semi-restricted (originating and terminating calls); fully restricted (originating and terminating calls); circuit-switched data call hunting	Single logical channel; fast select initiate/accept; flow control parameter negotiation; throughput class negotiation; Incoming calls barred; outgoing calls barred	Additional packet logical channels; permanent virtual circuits; packet closed user groups; electronic directory interface; extended ISDN service (remote)	Ameritech Custom Calling and Ameritech Advanced Custom Calling features are available to ISDN Direct customers
Bell Atlantic Corp. Arlington, Va. Contact local representative	ISDN Basic Rate Interface Service	Centrex customers only	BRI	Region-wide custom offering	Individual case basis	Individual case basis	Incoming call line identification; outgoing call line identification; time and date display; ISDN intercom; multiple directory number; shared directory number; privacy (4)	Speed calling; semi-restricted (originating and terminating calls); fully restricted (originating and terminating calls); intercom dialing; circuit-switched data call hunting (4)	Single logical channel; fast select initiate/accept; flow control parameter negotiation; throughput class negotiation; incoming calls barred; outgoing calls barred (4)	Additional packet logical channels; permanent virtual circuits; packet closed user groups; electronic directory interface; extended ISDN service (remote) (4)	All Centrex line and system features are available to Bell Atlantic ISDN customers
Nynex Corp. White Plains, N.Y. (914) 683-3365	Nynex ISDN Basic Exchange Service	Centrex, business and residential customers	BRI	2 cities (as of Jan. 1)	Varies by service option, pending approval by state PUC	Varies by service option, pending approval by state PUC	Incoming call line identification (within user group only); outgoing call line identification; time and date display; call review; ISDN intercom; multiple directory number; shared directory number; privacy	Speed calling; intercom dialing, circuit-switched data call hunting	Single logical channel; fast select initiate/accept; flow control parameter negotiation; throughput class negotiation; incoming calls barred; outgoing calls barred	Additional packet logical channels; permanent virtual circuits; packet closed user groups	Modem pooling (customer premises) (5); digital electronic telephone service (6); all Centrex line and system features are available to Centrex IS customers
Pacific Bell San Francisco Contact local representative	Centrex IS	Centrex customers only	BRI	25 cities	Feature Package A: $100 (7); Feature Package B: $120; Feature Package C: $150	Feature Package A: $17.50 (8); Feature Package B: $26; Feature Package C: $29.50	Incoming call line identification; outgoing call line identification; time and date display; call review; ISDN intercom; multiple directory number; shared directory number; privacy; calling number ID block	Speed calling; semi-restricted (originating and terminating calls); fully restricted (originating and terminating calls); intercom dialing; circuit-switched data call hunting	Single logical channel; fast select initiate/accept; flow control parameter negotiation; throughput class negotiation; incoming calls barred; outgoing calls barred	Additional packet logical channels; permanent virtual circuits; packet closed user groups; electronic directory Interface; extended ISDN service (remote)	All Centrex line and system features are available to Centrex IS customers
Southwestern Bell Telephone Co. St. Louis (314) 235-9553	Plexar with ISDN	Centrex customers only	BRI	12 cities	System: $410 (9); line: $235; D-channel: bundled in line charge	Bundled with line charge	Incoming call line identification (closed user group only); outgoing call line identification; time and date display; call review; ISDN intercom; multiple directory number; shared directory number; privacy; calling number ID block	Speed calling; semi-restricted (originating and terminating calls); fully restricted (originating and terminating calls); intercom dialing; circuit-switched data call hunting	Single logical channel; fast select initiate/accept; flow control parameter negotiation; throughput class negotiation; incoming calls barred; outgoing calls barred	Additional packet logical channels; permanent virtual circuits; packet closed user groups; electronic directory interface; extended ISDN service (remote)	All Centrex line and system features are available to Plexar ISDN customers
US West Communications Denver Contact local representative	ISDN/Basic Rate Service	Centrex and business line customers only	BRI	6 cities	Individual case basis	Individual case basis	Incoming call line identification; outgoing call line identification; time and date display; ISDN intercom; multiple directory number; shared directory number; privacy; calling number ID block	Speed calling; semi-restricted (originating and terminating calls); fully restricted (originating and terminating calls); intercom dialing; circuit-switched data call hunting	Single logical channel; fast select initiate/accept; flow control parameter negotiation; throughput class negotiation; incoming calls barred; outgoing calls barred	Additional packet logical channels; permanent virtual circuits; packet closed user groups; electronic directory interface; extended ISDN service (remote)	All Centrex line and system features are available to US West ISDN customers

BRI = Basic Rate Interface
PUC = Public utility commission

FOOTNOTES:

(1) All costs based on Illinois Bell Telephone Co. tariff. Costs do not include Centrex system charges.
(2) Line charges may differ depending on customer service area.
(3) All costs based on Illinois Bell Telephone tariff. Costs do not include the onetime ordering charge of $64 per account.
(4) Subject to local and state regulatory constraints.
(5) Modem pooling provides for the setup and clearing of data calls between a Nynex ISDN Basic Exchange Service line and the local exchange line using a modem for data transmission.
(6) Digital electronic telephone service provides greater call management through use of button control features and multiple call appearances.
(7) Pacific Bell offers three feature packages: Package A for 1B+D service includes a limited number of circuit-switched voice features; Package B for 1B+D service includes a more complete range of circuit-switched voice features plus D-channel packet-switching features; Package C for 2B+D includes all of the Package B features plus circuit-switched data features.
(8) All monthly costs include basic Centrex line charge.
(9) Rates based on starter tariff rates in Texas. Southwestern Bell will tariff ISDN on a customer-specific basis as well.

This chart includes a representative selection of offerings from RBHCs. Other carriers offer additional products. BellSouth Corp. was unable to provide information about its offerings by press time.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

(continued from page 64)

compatibility between services may not be immediately available; interim solutions that are not totally ISDN-compatible may have to be used.

RBHC PRI services are arousing some interest among users because the local exchange carriers have started testing them on a customer-specific basis.

In addition, RBHC PRI services will complement interexchange carriers' PRI services, particularly in light of industry developments such as PRINCE.

However, so far no Bellcore technical references define methods for interconnection of PRI services among the RBHCs. Bellcore wrote its technical references for existing ISDN BRI services. Until Bellcore issues a technical reference outlining these PRIs, each of the RBHCs will establish proprietary PRI connections, which will give users that want to build end-to-end ISDN wide-area nets yet another compatibility roadblock.

RBHC PRI service also will not make up for the lack of local exchange carrier-to-interexchange carrier signaling protocols. In many cases, the customer is sending an out-of-band signal to the serving Centrex switch, which still must send that call onto the interexchange carrier switch via in-band signaling.

Currently, it's not clear when the optimal ISDN interconnection protocol between interexchange carrier and local exchange carrier SS7 will be implemented.

In the local loop, ISDN's status is slightly different. Gradually, local exchange carrier ISDN services will be opened to non-Centrex users. Only Illinois Bell Telephone Co. has ventured into offering single-line ISDN service as an adjunct to business telephone service.

Having looked both at ISDN's progress and its problems, many users are intrigued enough to put ISDN compatibility requirements into requests for proposal and equipment plans. Their view is that ISDN will be needed sometime in the future — perhaps the near future — and as standards evolve, they do not want to find themselves left behind, forced to adjust equipment to be compatible with the next round of standards and scrambling to avoid rapid obsolescence. ◾

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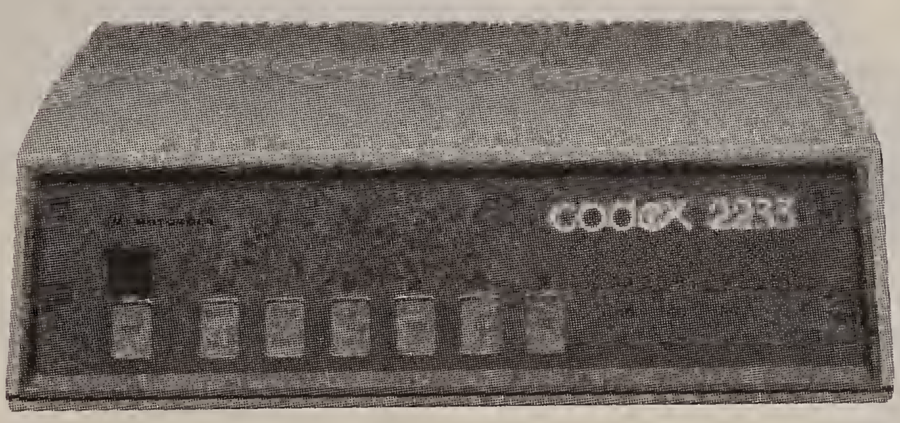

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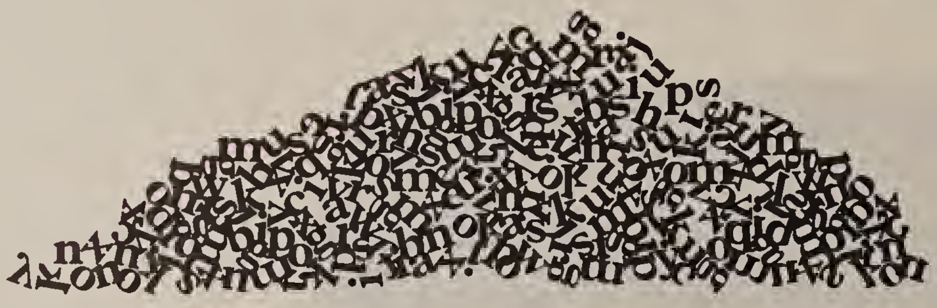

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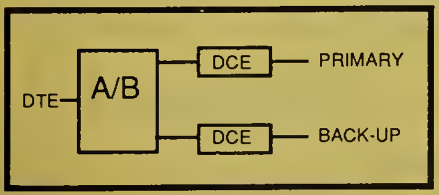
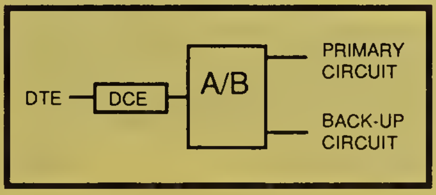


Spare Circuit Back-up



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MTRX-500	512 Ports
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*Largest Non-Blocked Port Capacity...8192 PORTS	YES	NO
*Up To 98% Data Cable Reduction DTE to DCE	YES	NO
*4000 FT DTE TO DCE With Twisted Pair Cable	YES	NO
*LAN Based PC Control - Ethernet Or Token-Ring	YES	NO
*Multi-tasking (VM-386) Universal Workstation	YES	NO
*Integral BERG/BERT and S.A.M. Test Functions	YES	NO
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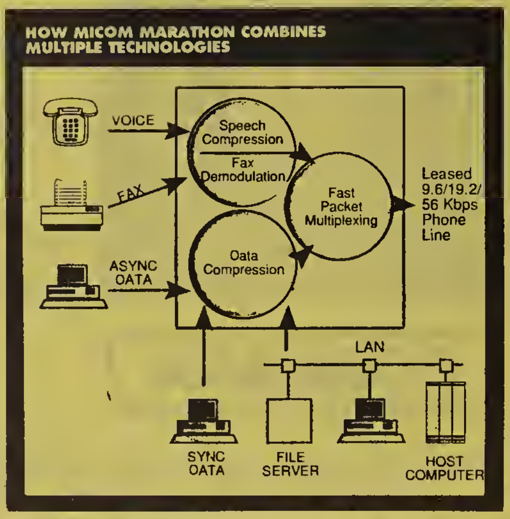

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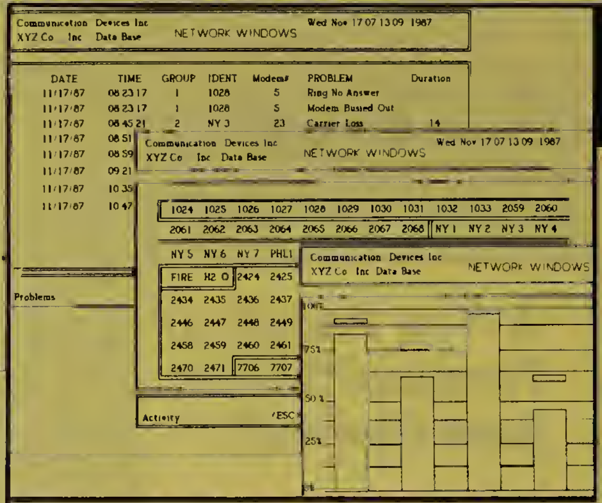
DIAL UP MODEM MANAGEMENT


Communication Devices Inc XYZ Co Inc Data Base NETWORK WINDOWS Wed Nov 17 07 13 09 1987

```
DATE      TIME      GROUP  IDENT  Modem#  PROBLEM            Duration
11/17/87  08 23 17  1      1028   5       Ring No Answer
11/17/87  08 23 17  1      1028   5       Modem Busied Out
11/17/87  08 45 21  2      NY 3   23      Carrier Loss       14
11/17/87  08 51
11/17/87  08 59
11/17/87  09 21
11/17/87  10 35
11/17/87  10 47
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Any Speed
Any Type, Including V.32

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Field Proven since 1983

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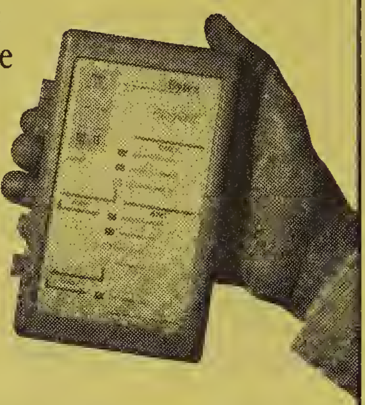

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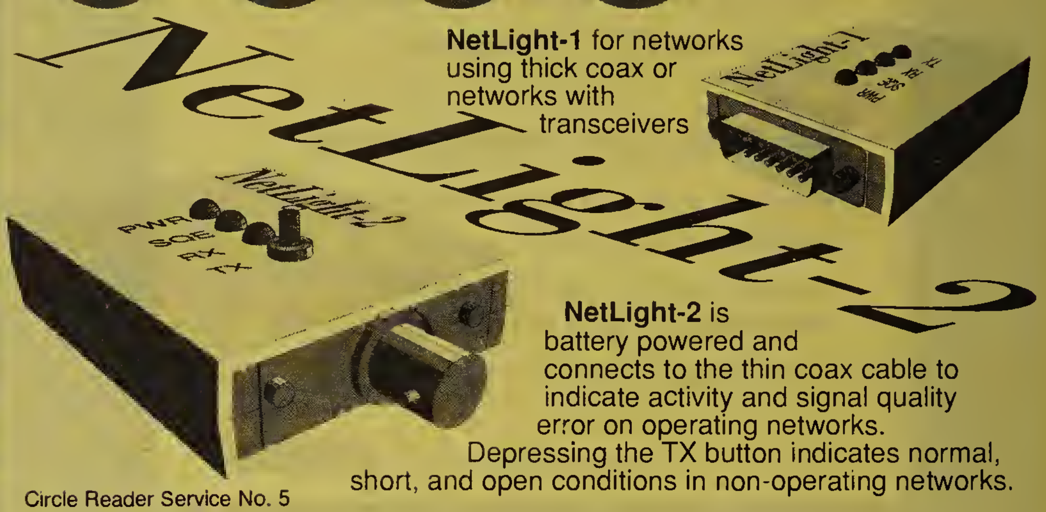
NetLight-2

ETHERNET™ Testing Through Thick and Thin



NetLight-1 for networks using thick coax or networks with transceivers

NetLight-2 is battery powered and connects to the thin coax cable to indicate activity and signal quality error on operating networks. Depressing the TX button indicates normal, short, and open conditions in non-operating networks.

Circle Reader Service No. 5

For Additional Information or to order your Netlight please call 1-800-525-2141 or contact:
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18 19 20 21 22 23 24 25
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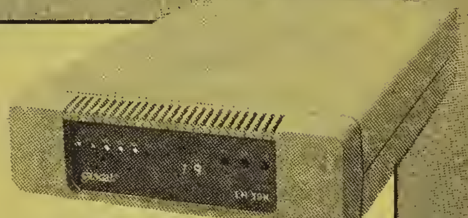
MODEM

The Top End for Your Bottom Line

$ 2395

Gandalf Introduces the LH19K Modem!



At any distance, the LH19K Modem offers exceptional features and fast transmission (19.2 Kbps) backed by proven technology from Gandalf, a market leader in data communications products and information systems.

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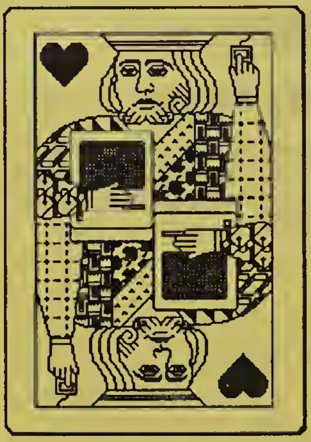

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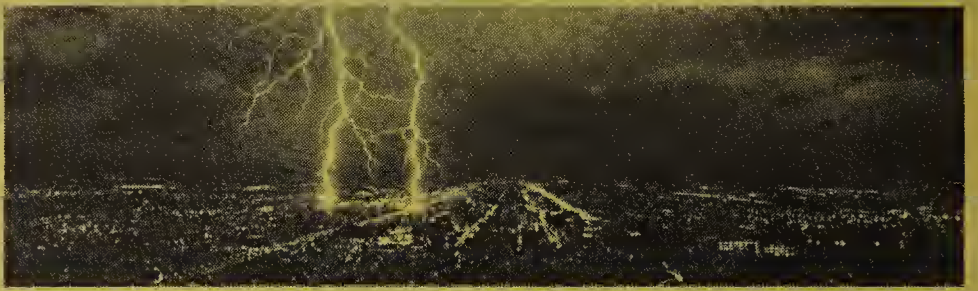

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Optimize system utilization, reduce modem line costs, prevent client loss.

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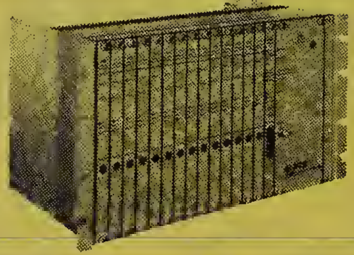
NETWORK SYNC MONITOR

FTS / AUSTRON

Network Synchronization Monitor



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- *Cesium, Rubidium, GPS, or Loran Master Clock systems available for comparison* ♦
- *Detects clock rate degradation before it causes frame slips* ♦

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Pinpoint Network Cable Faults Fast!

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- * Find cables in ceilings, walls, floors
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- * Isolate faulty network interface cards
- * Very simple to operate

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The LMI gives you in-depth plain English decodes, BERT/BLERT testing, time stamping, and interactive simulation.

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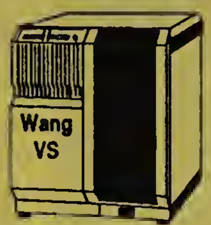
PC LAN/WANG VS CONNECTIVITY

Wang VS Users:

Hitch It or Ditch It



PC Local Area Networks are here to stay, and changes are inevitable.

You could hitch your VS resources to PCs, LANs and Macintoshes by adding Lightspeed NVS. The results: regained control of PC resources, powerful applications made available to more people, and improved work group productivity. Plus no loss of investment.

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MacSoft

Circle Reader Service No. 14

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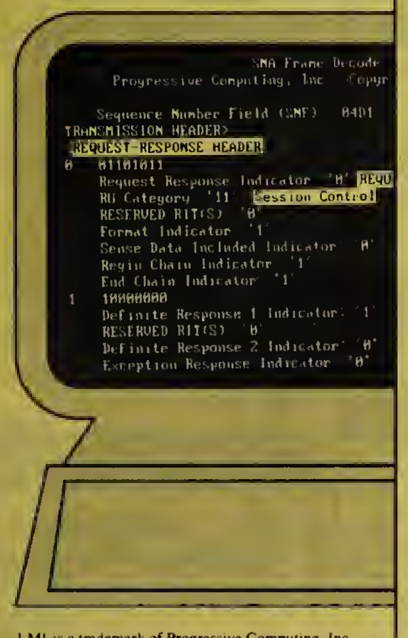
PROTOCOL ANALYZER

A PC-based protocol analyzer that speaks your language. Plain English!



```
                         SNA Frame Decode
   Progressive Computing, Inc    Copyr

  Sequence Number Field (SNF)   04D1
TRANSMISSION HEADER>
REQUEST-RESPONSE HEADER
0   01101011
     Request Response Indicator  '0' REQU
     RU Category  '11'  Session Control
     RESERVED BIT(S)  '0'
     Format Indicator  '1'
     Sense Data Included Indicator  '0'
     Begin Chain Indicator  '1'
     End Chain Indicator  '1'
1    10000000
     Definite Response 1 Indicator  '1'
     RESERVED BIT(S)  '0'
     Definite Response 2 Indicator  '0'
     Exception Response Indicator  '0'
```

Now you can analyze data and zero in on errors more quickly. The LM1 Protocol Analyzer gives you easy-to-read decodes spelled out in plain English. It uses exact language from the standards for X.25, SNA, QLLC, and Q.931 protocols.

With the LM1, you don't miss a bit. It displays and explains every bit in a frame. It also highlights key details.

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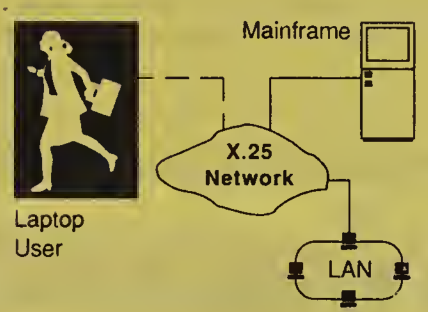
X.25 NETWORK CONNECTIVITY

MAX X.25

EXPAND YOUR NETWORK TO USERS ON THE GO.



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- Multiple emulations with most popular protocols
- Multiple sessions
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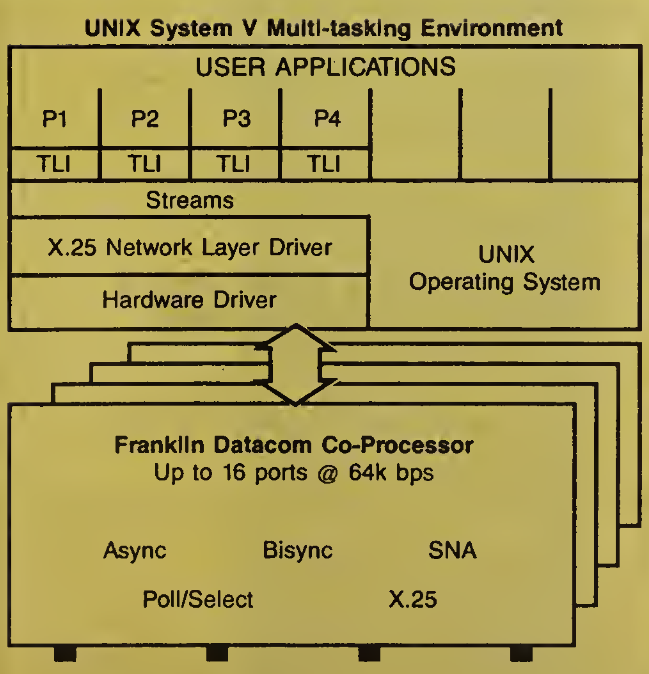
- * X.25 Switch/PAD Option.



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TLI TLI TLI TLI

Streams

X.25 Network Layer Driver

Hardware Driver

UNIX Operating System

Franklin Datacom Co-Processor
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Async Bisync SNA

Poll/Select X.25

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Circle Reader Service No. 16

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OST, Inc. developed the PASS 25 to meet the demands of their end users by providing multiple connections in one unit. The PASS 25 is a multi-protocol X.25 switch that reduces network overhead costs by allowing systems that use different protocols to utilize the same transport network.

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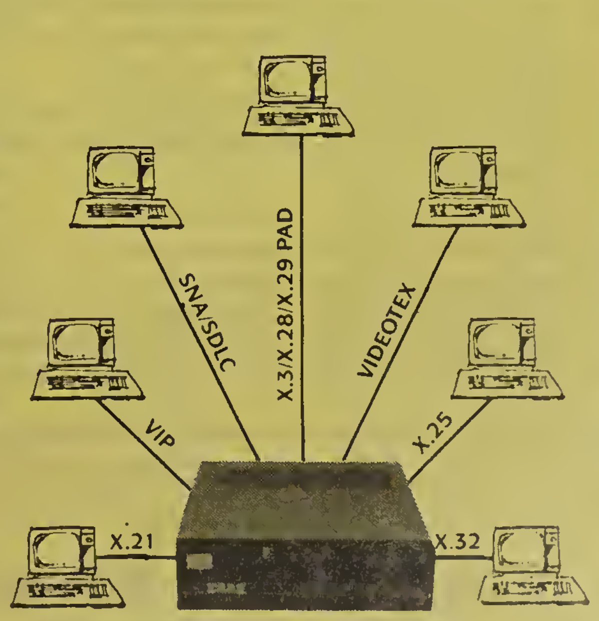

Demonstration model will be presented at TCA Booth #509.

OST

OST, Inc.
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Chantilly, Virginia 22021
(703) 817-0400

Circle Reader Service No. 13

NETWORKING MARKETPLACE

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Digilog protocol analyzers... power, speed, and simplicity

When a crisis develops on your network... a break on the line, poor response time, maybe a software glitch... there's no time to fool around. Your job may depend on your ability to quickly diagnose the problem and get the system back in working order.

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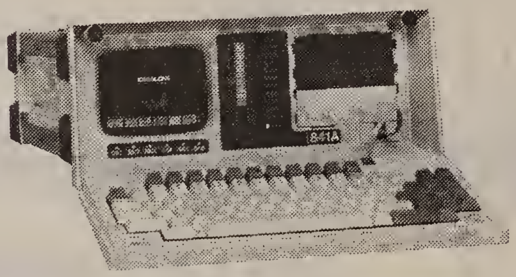

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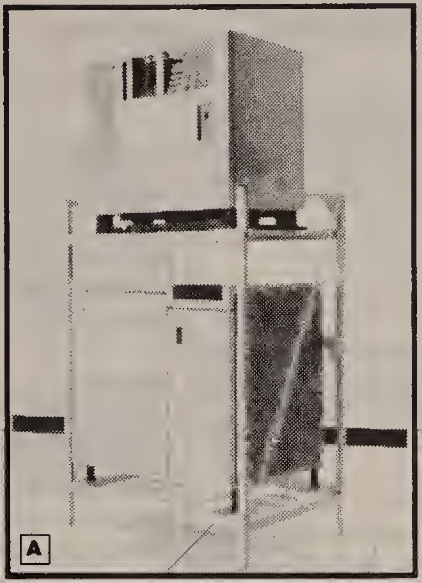
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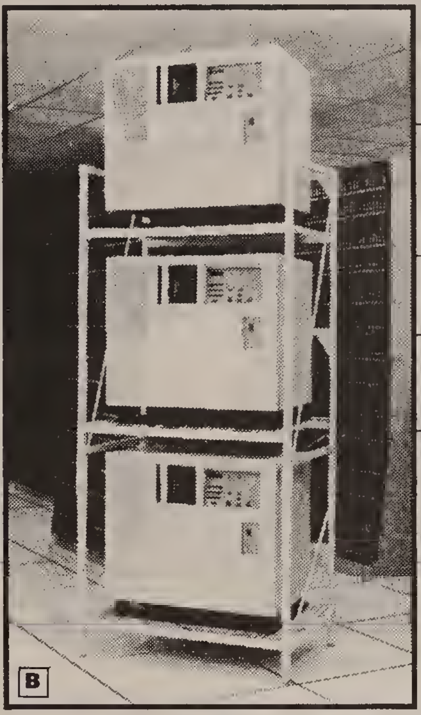
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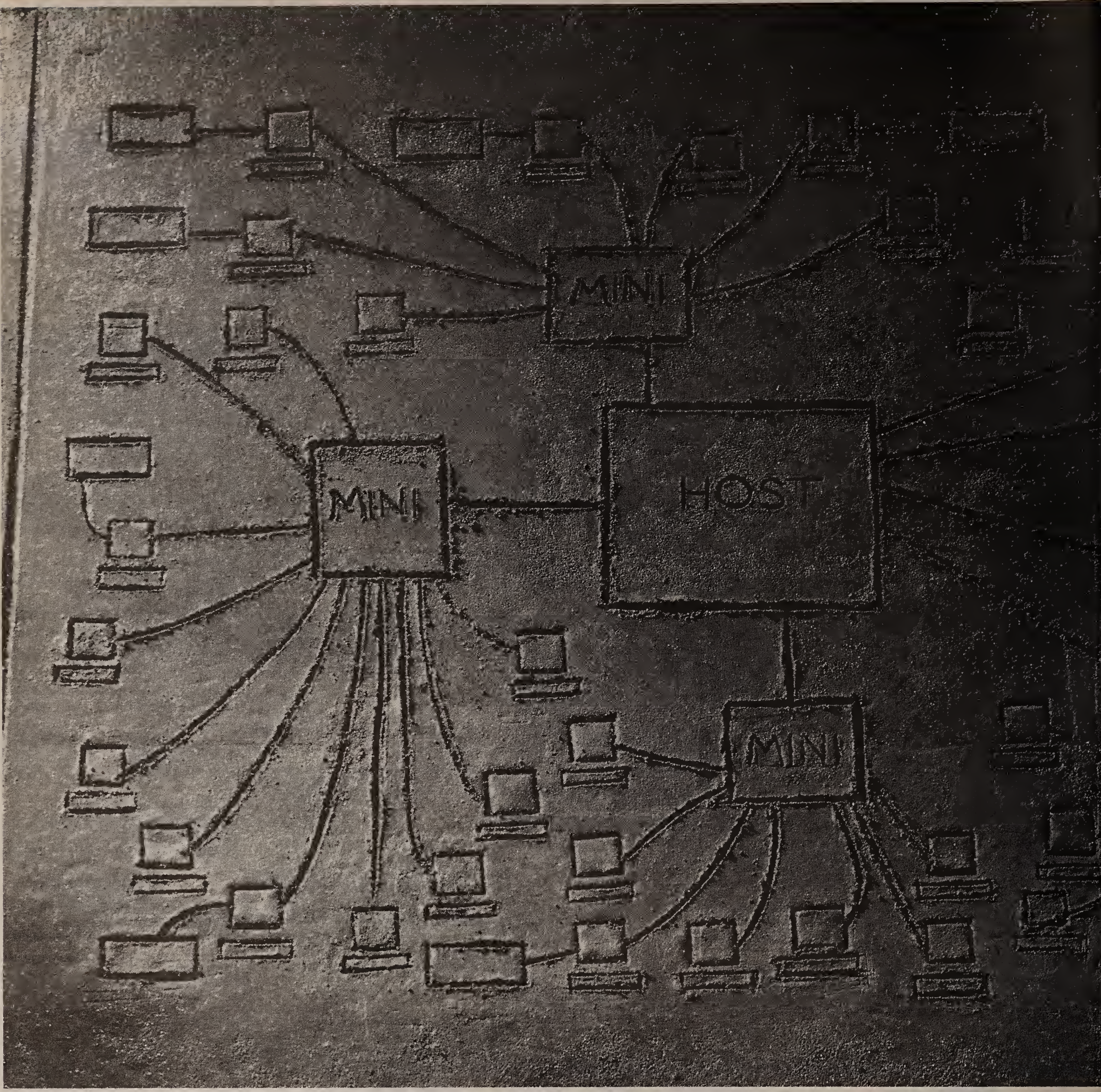

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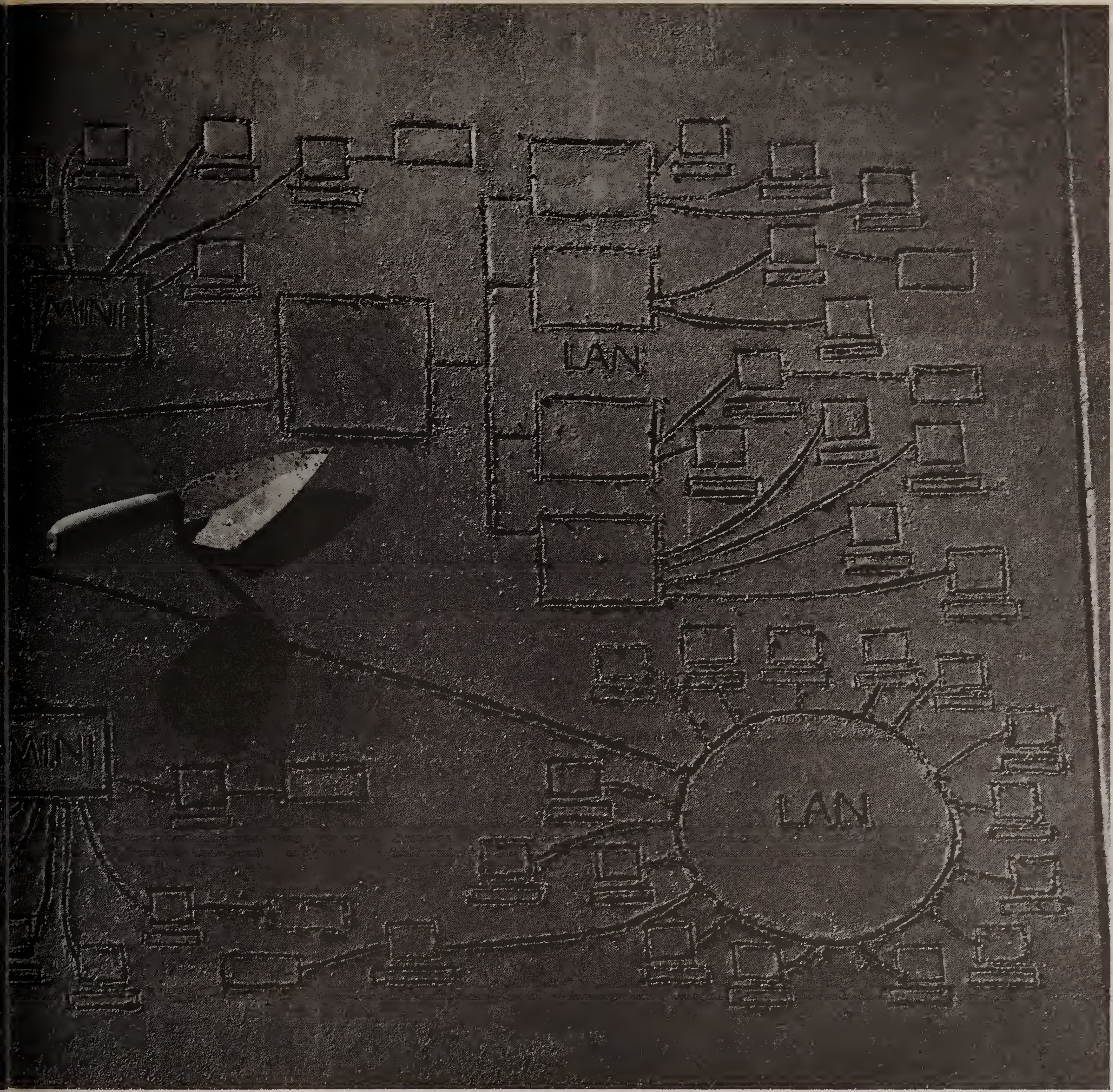

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CCITT readies EDI/X.400 standard

continued from page 2

"There are close to 30 ways to move EDI," said Steve York, manager of information exchange technology at Hughes Aircraft Co. in Long Beach, Calif. "Ideally, we'd like to scope it all down to one messaging protocol that moves all of our traffic.

"Eventually, I'd like to obtain all messaging services from a single vendor and take advantage of the economies that go along with that," York said. "Now that is difficult to do."

Mark Payne, worldwide EDI deployment manager for Texas Instruments, Inc. in Plano, Texas, applauded the CCITT's progress on X.435.

"We look for X.400 to be our strategic communications carrier for external E-mail and EDI documents," Payne said. "One of the beauties of sending EDI over X.400 is that it will no longer matter what kind of hardware we and our trading partners are running.

"X.400 will let us send X.12 and [EDI for Administration, Commerce and Transport] data much quicker and cleaner than other protocols, like SNA, [because] X.400 provides more error checking, for example," he added.

The X.435 draft recommendation is being considered by Study Group VII of the CCITT, an international standards body.

"Although EDIFACT and X.12 are standards, you still need a transport medium, and that's where X.400 comes in," said Peter Bowie, vice-chairman of Study Group VII and supervising engineer for data standards development at Bell Canada.

The draft recommendation is being considered under the CCITT's accelerated approval process rather than under its typical four-year cycle because of the pressing need for a standard, said Herbert Bertine, vice-chairman of Study Group VII and head of the standards planning department at AT&T Bell Laboratories.

"If X.435 passes Study Group VII, that's a sign for manufacturers, service providers and users that we've got a stable document," Bertine said. "Users can send EDI messages over X.400 now, but they've all invented their own way of doing it. The X.435 draft recommendation provides a uniform way of doing this."

Ted Myer, chairman of Rapport Communication, Inc., a Palo Alto, Calif., consulting firm, said the X.435 standard would bring together "two branches of the data communications industry, EDI and E-mail, that grew up separately."

Users are hopeful that vendors will soon begin to develop products supporting EDI-over-X.400 transmissions. But some large users aren't holding their breath.

"It will still be some time before you're actually going to see software for EDI over X.400," Payne said. "We're still talking about 12 to 18 months from now."

Payne said TI has begun testing interim methods for sending EDI over X.400. It is involved in one such test with Digital

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CCS7 tariffs await judgment from FCC

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port. On that score, the RBHCs have not been forthcoming enough, FCC sources said, adding that the RBHC CCS7 access tariffs are sometimes jokingly referred to as "access to nowhere" by the FCC because they don't specify what equipment or services with which the signaling information will interface.

The FCC and the RBHCs are already wrangling over at least one CCS7 service, a new querying service for each local exchange carrier's Line Information Data Base (LIDB), which would allow both long-haul and local carriers to obtain calling card verification information through the out-of-band signaling capabilities of CCS7.

The RBHCs, with the exception of Southwestern Bell Corp., said they believe they should be able to offer LIDB on a non-tariffed basis when the RBHCs strike separate contracts with carriers. The FCC, however, is adamant that LIDB should be a regulated, tariffed service.

But identifying CCS7 services and tying them to cost allocation is not the only factor holding up the regulatory review of pending CCS7 tariffs.

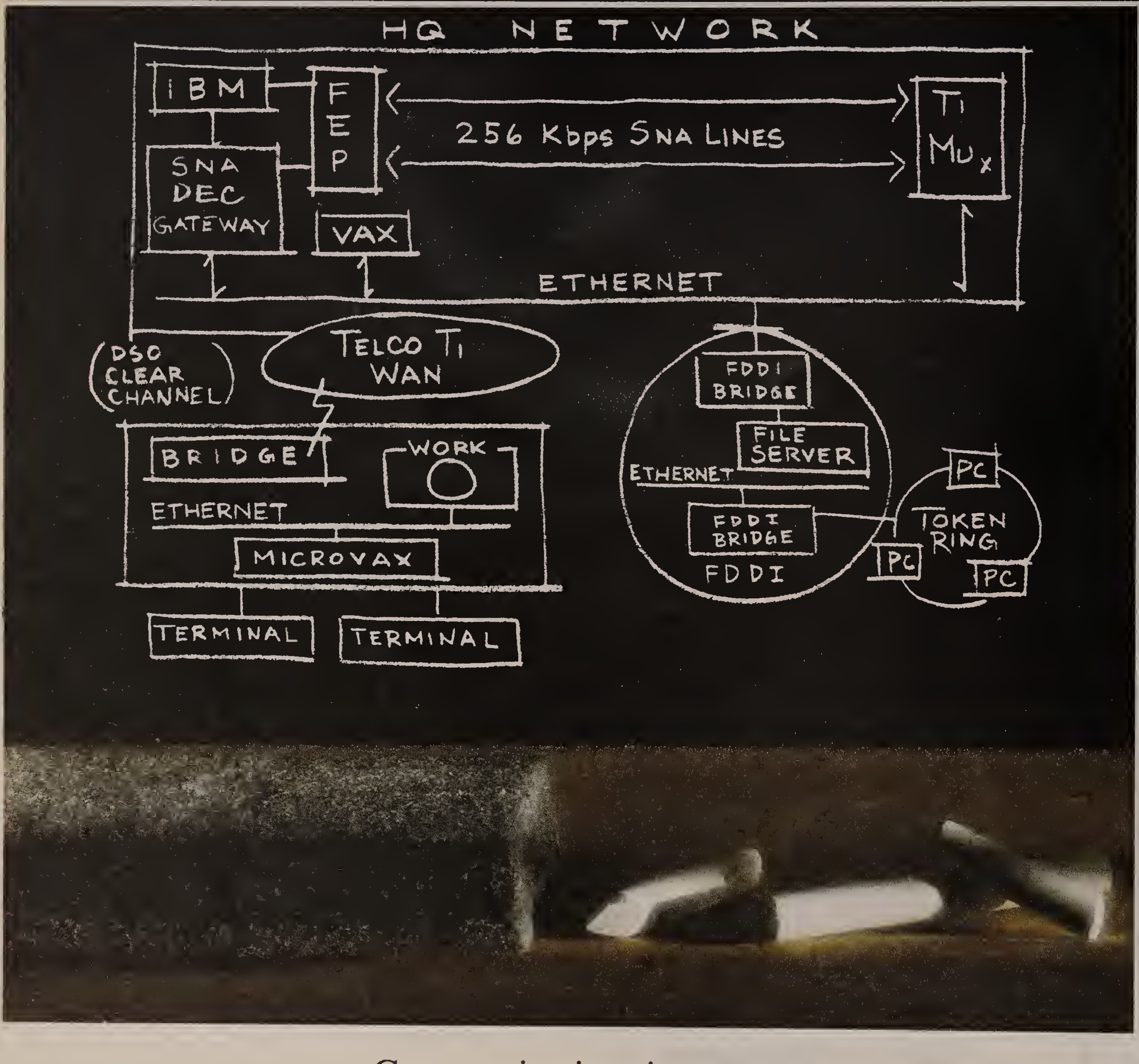
The FCC faults the RBHCs for some of the delay in getting CCS7 off the ground, stating that, with the exception of Southwestern Bell, the carriers have neglected to follow correct procedure by failing to file a Part 69 waiver request for establishing the CCS7 offerings as a new switched access service.

The FCC said that in their haste to rush CCS7 out as a service offering, the RBHCs have filed tariffs before filing Part 69 waivers. Consequently, the FCC said it doesn't plan to approve any CCS7 tariffs until it has approved a Part 69 waiver.

James Blaszak, an attorney for the Ad Hoc Telecommunications Users Committee, however, said the FCC's decision to follow a complicated waiver process will not serve the public interest in the long run.

"Waivers don't draw the kind of analysis a rule-making would," he said. "A rule-making proceeding would give the best forum for coming to the best understanding of the issues."

Regardless, the need for a uniform regulatory policy is growing as CCS7 networks are brought up by carriers and more CCS7 tariffs are filed. Spokesmen for Bell Atlantic Corp., Nynex Corp. and US West Communications, Inc. said their companies plan to file CCS7 tariffs early next year. ◪



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THE POWER IS ON

Critics: FCC shirking responsibilities

continued from page 8

neys were interviewed for this article, none were willing to let their names be used because they represent clients at the FCC.

But in private, it is common to hear attorneys complain that the FCC has been used too frequently as a tool to implement political dogma, rather than as a forum for impartial arbitration.

Former FCC Chairmen Mark Fowler and Dennis Patrick "came to the FCC preprogrammed by the White House to implement certain things," such as deregulating carriers, one telecommunications attorney said privately. "Every time the FCC gets reversed, it's because it has done things half-baked in order to give a deal to the Bell operating companies or AT&T."

Others are quick to defend the agency. They say the FCC is struggling in a dynamic marketplace with meager resources and a set of laws that are outdated.

"The commission is operating under a statute [the Communications Act of 1934] that hasn't been amended in 50 years and yet must make decisions in an area that is one of the most rapidly changing in the world," said Michael Wack, a telecommunications attorney formerly with the FCC but now in private practice. "Inherently, this situation lends itself to reversal [by the courts] since the commission occasionally tries to stretch too far."

Henry Rivera, an FCC commissioner from 1981 to 1985 and now in private practice, agrees that many of the agency's problems are created by outside forces. He said budget problems, rapidly changing technology and market demands that exceed the framework of the Communications Act all contribute to the FCC's woes.

But many attorneys claim that the FCC's problems go deeper than budget problems and a law overdue for revision.

In a speech last month, FCC Commissioner Ervin Duggan said he is disturbed by the inner workings of the agency. Until the last decade, he said, FCC commissioners functioned on a fairly equal basis with everyone and were given an opportunity to work out policies through debate.

Staff members heading up bureaus were career employees who were able to present their own views to the full commission on important proceedings, Duggan said. Now each FCC chairman brings in his own staff, including heads of bureaus, he said. In the past 10 years, there have been seven different chiefs of the FCC's Common Carrier Bureau, which oversees tariff filings.

The FCC has become captive to a top-down process in which the chairman is vested with virtually all the power to review items and determine what the other commissioners see, Duggan said.

This "system of top-down, one-option deliberation is a frustrating and often stultifying parody of collegiality," Duggan said. "All too often, the process asks individual commissioners not for their substantive contributions, but merely for their obedient pawprints." ◘

NW panel takes stand on E-mail privacy

continued from page 4

mail is being used solely for business applications is an effective management tool."

Chuck Papageorgiou, network administrator for United Parcel Service, Inc. in Paramus, N.J., agreed. He said it's naive for an employee to expect E-mail to remain confidential.

Michael Toto, president of the Association of Data Communications Users and vice-president of corporate telecommunications for Johnson & Higgins in Princeton, N.J., added, "There's no such thing as private E-mail, only business E-mail, and any supervisor can rightfully access a subordinate's messages." Toto said his company has not yet defined a privacy policy that addresses electronic messaging.

But other panel members said their companies have adopted formal privacy guidelines as a result of the Epson lawsuit.

One member said his company, which he asked not be named, now presents E-mail users with an on-line reminder about the firm's policy toward E-mail each time they log on to the system. The statement informs users that the equipment is limited to business-related communications and that the company reserves the right to monitor all messages.

Michael Kaminski, manager of CIM/Networking Technologies at the General Motors Corp. Technical Center in Warren, Mich., said E-mail privacy is a serious issue that all companies should address. He said GM's policy is not to spy on employees.

"The company's philosophy is that the workplace is an environment of mutual trust and respect. This precludes a policy of accessing employee E-mail," he said.

Thomas Festa, president of the Wall Street Telecommunications Association and manager of voice communications at Liberty Brokerage, Inc. in New York, said, "Companies would surely cut down on the personal use of E-mail if [employees] know they'll be held accountable."

But others said legitimate correspondence could be stifled by such a policy.

"An employee wouldn't necessarily need to be abusing the system to feel the chilling effect. It could [result] simply from a fear that what's being transmitted could be misconstrued," said Lionel Gillerman, manager of network technology at McDonnell Douglas Aerospace Information Services Co. in Cypress, Calif.

Gillerman said his company has no official E-mail policy. "The company assumes that E-mail is being used for business purposes and feels strongly that it doesn't have the right to monitor it," he said. ◘

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Five years of SDN shape net industry

continued from page 1

dent of TeleChoice, Inc., a consultancy in Montclair, N.J. "Managers were confronted with a major decision: 'Should I be using my resources to run a private network or would my company be better served by a virtual network managed by the carrier?' "

For NCR Corp., the choice was simple.

"SDN has allowed me to turn the responsibility of engineering and adding circuits to the network — the grunt work — over to the carrier," said Fred Davidson, corporate telecomputing services director for NCR in Dayton, Ohio. "This allowed me to use the resources needed to manage our private network for more important efforts, such as [determining] how to use our network to support the company's business goals."

NCR has migrated from an Electronic Tandem Network (ETN) to an SDN supporting nearly 180 sites across the country. The computer maker runs more than four million minutes of traffic a month over its virtual network.

Originally designed to lure large private net users to the switched network, SDN has grown from being used in a handful of companies to more than 900 today.

The list of companies that use SDN or custom nets that incorporate SDN reads like a who's who of the Fortune 1,000, including American Express Co., Atlantic Richfield Co., E.I. du Pont de Nemours & Co., Electronic Data Systems Corp., Exxon Corp., Ford Motor Co., General Electric Co., General Motors Corp., Philip Morris Companies, Inc. and RJR Nabisco, Inc.

One reason for SDN's popularity is the number of new features it supports, such as data handling capabilities and international reach (see "Global SDN and SDDN expand net horizons," this page). In addition, AT&T is planning a raft of new SDN features.

AT&T SDN Product Manager Glenn Starr said select SDN users are currently beta-testing an unannounced on-line call detail feature, which allows customers to use AT&T's Accumaster Services Workstation to access call records just minutes after calls are made. This will, among other things, enable SDN users to more quickly spot toll fraud.

Many current SDN users say AT&T will offer its EasyLink electronic mail service under SDN, and AT&T's facsimile service will also likely be tied into SDN.

In addition, AT&T's Starr said the company is readying an optional voice mail feature for SDN. The feature would enable users to offer a uniform voice mail capability to all sites and would obviate the need for premises-based voice mail systems or services.

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Global SDN and SDDN expand net horizons

Forward-thinking AT&T Software-Defined Network (SDN) customers are planning applications based on SDN's data handling capabilities and are using Global SDN to expand domestic SDNs to include sites in other countries.

Announced in May, the Software-Defined Data Network (SDDN) option enables users to establish high-speed switched data links on demand; it supports 56K, 64K and 384K bit/sec links. SDDN is more economical than private lines for users with less than four hours of data traffic per day, AT&T said.

Navistar International Transportation Corp. was one of the first SDN customers to beta-test SDDN.

"It's worked flawlessly," said Barney Lykens, network planning manager with Navistar's information systems services group.

Navistar initially used SDDN to dial up two 56K bit/sec links to form a single 112K bit/sec channel for a videoconferencing application.

"We're looking at SDDN's [planned] 384K bit/sec capability to back up T-1 links and handle [computer-aided design and manufacturing] applications," Lykens said.

William Miller, corporate telecommunications director for Control Data Corp., said his company is considering SDDN to support videoconferencing, local-area internetworking and disaster backup. "SDDN is an efficient means of supporting applications that require high bandwidth for about three or four hours," he said.

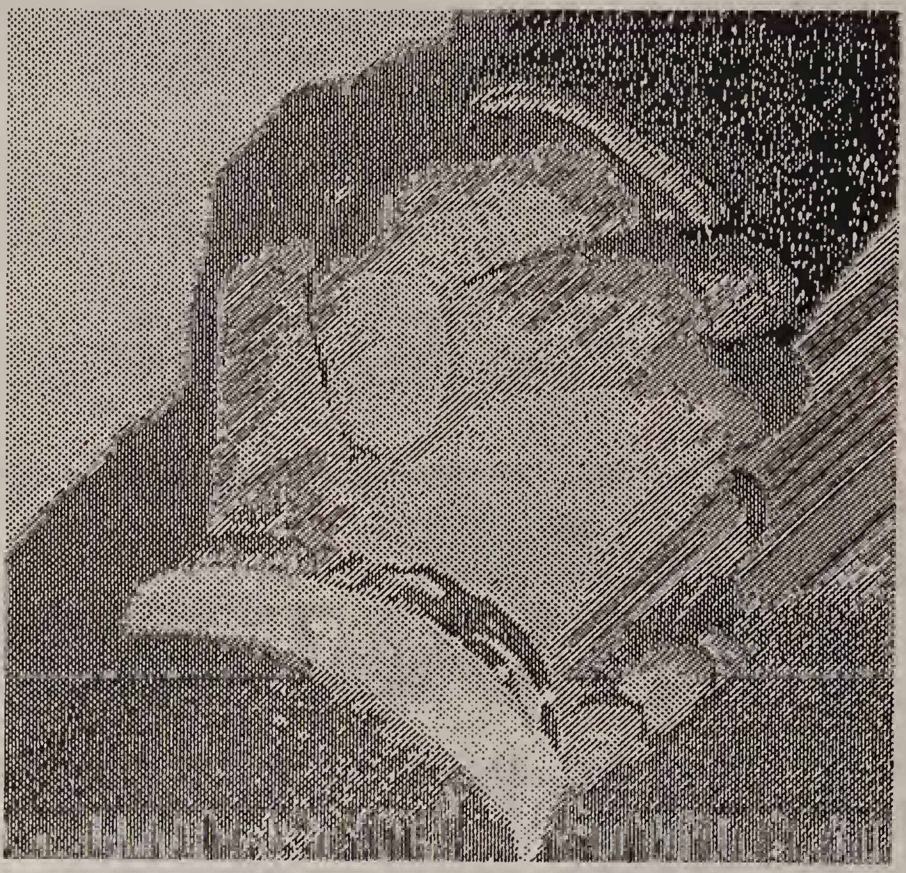
Global SDN enables users to extend virtual nets to international sites. The service is offered now in the U.K. and Australia and will be available in 15 countries within two years.

Global SDN pricing is 50% to 60% below standard AT&T long-distance rates and can be a cost-effective alternative for companies with over two hours a day of point-to-point international long-distance calling, AT&T said.

But for a long time, some foreign post, telegraph and telephone administrations and carriers didn't want AT&T to locate Global SDN gateway switches in their backyards.

So, more than a year ago, Miller, Lykens and others began visiting heads of PTTs and key foreign carriers to make the case for virtual networks. The users persuaded some carriers to allow AT&T to offer Global SDN in their countries.

— *Bob Wallace*



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Users, carriers praise Adaptive's new T-3 switch

FRAMINGHAM, Mass. — Users and carriers last week applauded the introduction of Adaptive Corp.'s T-3 switch, saying it will enable them to better support evolving high-speed net needs.

The strengths of Adaptive's Synchronous Optical Network Transmission Manager (STM) include its interoperability with Network Equipment Technologies, Inc.'s (NET) mainstay Integrated Digital Network Exchange (IDNX) line, dynamic control of bandwidth and fault tolerance, users said.

Adaptive, a subsidiary of NET, announced that Sears, Roebuck and Co.'s Sears Technology Services, Inc. will be the company's first customer.

Gary Weis, senior vice-president of networking and technology services in the Data Communications Department at Sears Technology, said the company hopes to install an Adaptive STM in its Dallas, Columbus, Ohio, and Schaumburg, Ill., data centers in the fourth quarter of 1991. Each data center switch will be linked to the two others via two T-3 links and will support bulk data transfers among IBM 3090-600J mainframes, he said.

Sears Technology plans to tie the STMs to its mainframes using IBM's 3172 Interconnect Controllers. The controllers support T-1 interfaces to the switches and fiber-optic host channel connections compatible with IBM's recently announced Enterprise Systems Connection channel architecture.

Sears Technology currently terminates T-3 lines with channel banks that break out T-1 lines and feed them into IBM 3745 front-end processors.

"We're looking for the Adaptive product and the 3172 from IBM to be a more flexible and cost-efficient vehicle to manage the bulk data or batch traffic between our data centers," he said.

The STMs will also be used for T-1 drop-and-insert multiplexing. "[Without] implementing the STMs, we would have had a T-1 connecting Tuscon, Ariz., with New York, for example," Weis said. "After this implementation, we will terminate the T-1 between Tuscon and Dallas, use the Adaptive product to ride the DS3 between Dallas and Columbus and then have another T-1 between Columbus and New York."

A large user of NET IDNX multiplexers, Sears Technology opted not to install NET's high-end IDNX/90 to support T-3 communications, Weis said. "It would have gotten us in the door in terms of capacity," he said. "But it couldn't satisfy our growth plans. The IDNX/90 would have required two separate boxes in each of the data centers, whereas the Adaptive implementation only requires one box in each of the centers, and it's upgradable."

Sears Technology will manage both the STM and IDNX products via NET's management scheme, which Sears Technology has already tied into IBM's NetView net management system.

Weis said he foresees other large users purchasing STMs for reasons similar to those that convinced Sears Technology to order the switches.

"In the upper echelon of large user networks, there is a good fit for this product," Weis said. "This is clearly not something a small firm would use."

While NET plans to deliver a cell relay, packet switching-based Asynchronous Transfer Mode product at a later date, Weis said Sears Technology will be satisfied with the circuit switching-based STM.

"For the kinds of bandwidth we're dealing with, I personally believe circuit switching is the only way to go," Weis said.

Carriers too

NET will also market its STMs to carriers, and MCI Communications Corp. has shown early interest in the product. In fact, the carrier may use the switches to support the switched T-1 and T-3 services it announced at the recent Tele-Communications Association, Inc. conference.

"We're looking at the STM to add more intelligence to the network, more capacity management and the ability to have more control over what we can offer to customers," said Don Heath, vice-president of data marketing at MCI. "Right now, everything is [dedicated], so the STM could give us the ability to more dynamically provision service capabilities to our users."

— *Bob Brown*

Firm unveils SONET T-3 switch

continued from page 1

Adaptive is a spin-off of Network Equipment Technologies, Inc., which makes the Integrated Digital Network Exchange (IDNX) line of multiplexers, including the high-end IDNX/90, which supports as many as four T-3 links.

MacLean said the STM would not compete directly with the IDNX/90 because her firm's switch does not support channels smaller than T-1 and does support a larger number of T-3s.

Although 45M bit/sec T-3 service is beyond the needs of many users, analysts said the economies T-3 can provide are

(continued on page 88)

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Adaptive plans support for new HSSI spec

MENLO PARK, Calif. — Adaptive Corp. last week became the latest vendor to throw its support behind a specification that defines a physical interface to connect computers and data communications equipment at up to 52M bit/sec.

Adaptive, a spin-off of T-1 multiplexer maker Network Equipment Technologies, Inc., said it would support the High-Speed Serial Interface (HSSI) specification on a new Synchronous Optical Network (SONET)-based broadband switch (see "Firm unveils SONET-based T-3 switch," page 1).

The HSSI specification was jointly written about a year ago by cisco Systems, Inc., headquartered here, and Santa Clara, Calif.-based T3plus Networking, Inc., and is currently under consideration by about 50 companies worldwide. The proposed standard will eventually be presented to both ANSI and the Consultative Committee on International Telephony and Telegraphy, according to officials at cisco Systems and T3plus.

HSSI is expected to provide a uniform standard for an interface between data terminal equipment and data communications equipment that operates at speeds up to the SONET Optical Carrier (OC)-1 rate of 52M bit/sec but can be configured to work at any speed below OC-1. It is analogous to the existing RS-232 and V.35 interfaces, but for much higher speeds.

The HSSI specification defines a 50-pin interface that uses a serial clock and data signal similar to those used by V.35 or RS-422 interfaces, said Alan Menezes, director of marketing for T3plus. HSSI also specifies a small computer system interface (SCSI)-2 cable, an off-the-shelf cable used to connect HSSI interfaces. Both of those features make it relatively easy for vendors to comply with the standard, he said.

Vendors, including IBM, are apparently working to support the standard on an array of equipment.

Gary Weis, senior vice-president of networking and technology services in the data communications department at Sears Technology Services, Inc., said his company is pushing IBM to provide an HSSI interface on the IBM 3172 Interconnect Controller. The 3172 is used to attach local-area networks to an IBM mainframe channel or to connect a mainframe channel to T-1 lines.

Weis said he wants to use HSSI to link the 3172 to Adaptive's new T-3 broadband switch so Sears Technology can ship data at high speeds among its three data centers. Weis said Sears Technology is trying to encourage all its vendors to support HSSI.

An IBM spokesman confirmed that the firm is evaluating the HSSI specification but declined to indicate whether it would be supported on the 3172.

A handful of vendors have already announced products that support HSSI.

— *Paul Desmond*

Firm unveils SONET-based T-3 switch

continued from page 87

compelling. Rosemary Cochran, a principal at Vertical Systems Group, a consultancy in Dedham, Mass., said a T-3 circuit provides the capacity of 28 T-1s but only costs as much as six to 11 T-1s, depending on mileage and the carrier.

STM plans

Sears Technology Services, Inc., the first company to place an order for STMs, said it hopes to use the switches in a T-3 backbone linking three major data centers (see "Users, carriers praise Adaptive's new T-3 switch," page 87).

The STM can support up to 18 T-3 links, 336 T-1s or a combination of the two. It switches only T-1 or larger channels and can accept feeds from any device that supports a T-1 interface, including multiplexers, private branch exchanges, routers and imaging and video equipment.

Unlike existing T-3 multiplexers, the STM has a SONET switching matrix based on 1.728M bit/sec channels, according to Charles Giancarlo, vice-president of marketing for Adaptive. T-3 multiplexers use 1.544M bit/sec T-1 channels.

The SONET core is intended to make it easier to migrate to the SONET-based services carriers are expected to roll out over the next few years.

"You can't slap a SONET interface on something that doesn't have a SONET switching core," MacLean said. Adaptive's T-3 and T-1 interfaces map data into the higher speed SONET channels.

Customers will be able to manage the switch using a scheduled software release of NET's IDNX net management system.

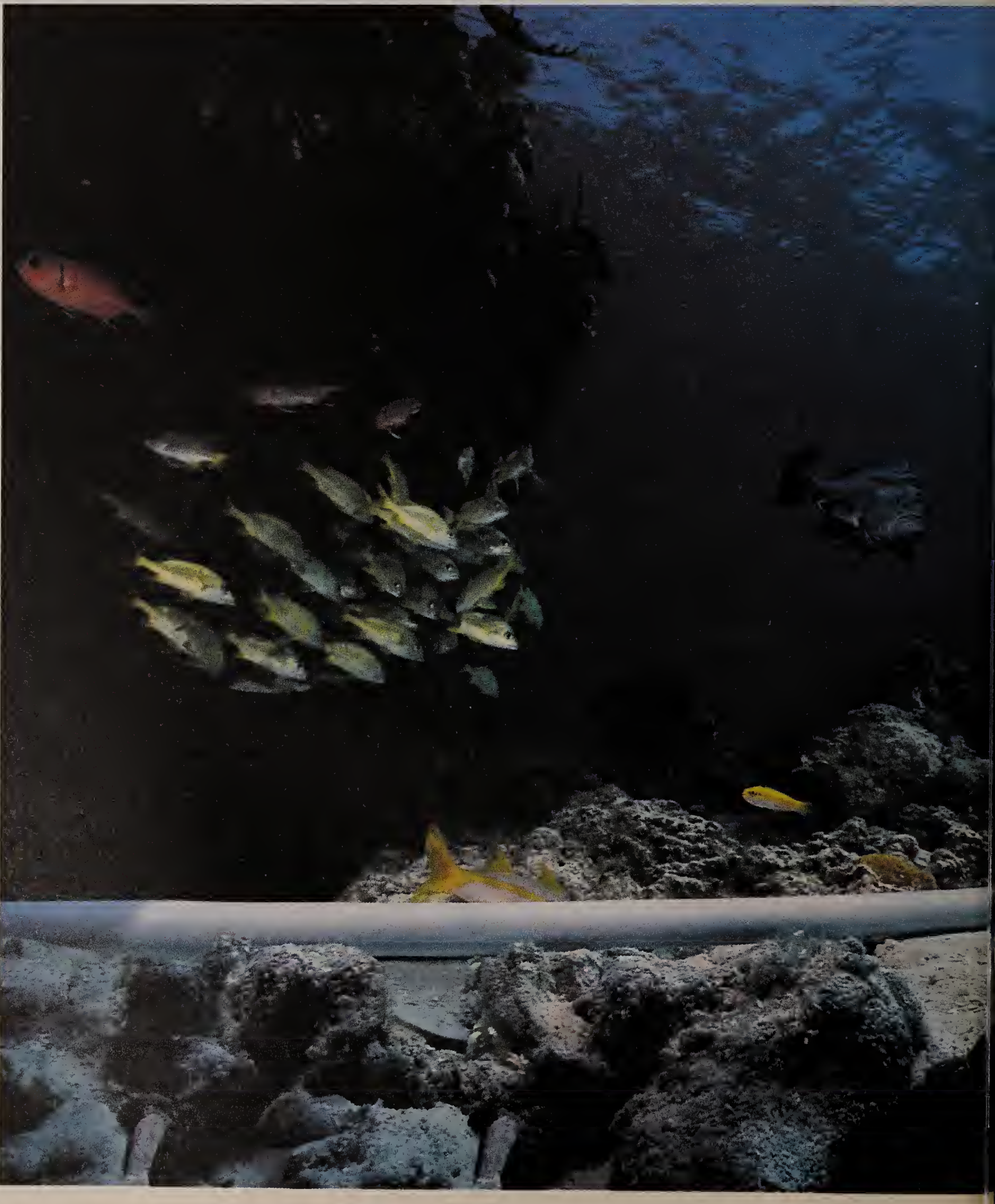
Interface modules

Four interface modules will be available when the STM ships in mid-1991.

One T-3 interface supports 28 T-1s, and a second supports eight T-1s. Neither can pool multiple T-1s to achieve higher bandwidth pipes as can the third interface module, called the High Speed Serial Interface (HSSI).

Based on an emerging industry standard, the HSSI module supports speeds up to the SONET Optical Carrier-1 interface rate of 51.84M bit/sec (see "Adaptive

Without AT&T, a problem down



plans support for new HSSI spec," page 88).

The final STM interface module supports four Integrated Services Digital Network Primary Rate Interface links. The module also acts as an ISDN D channel server, meaning the D channel can be used to dial up switched T-1 or T-3 facilities as required to handle peak traffic periods. On a private net, the signaling standard could also be used to access excess bandwidth on demand for applications such as videoconferencing.

Analysts said the STM is difficult to compare to existing T-3 offerings because it fills a different niche.

Berge Ayvazian, vice-president of communications research at the Yankee Group, a consultancy in Boston, said the fact that the STM is a SONET switch puts it in a different category than the T-3 offerings of traditional NET competitors such as Infotron Systems Corp., Newbridge Networks, Inc. and Timeplex, Inc.

They also agreed that the STM's dial-up T-1 and T-3 capability distinguishes the box. "Dialing up a T-1 is a unique capability," said Mark LaRow, senior manager at Ernst and Young's Network Strategies, a consultancy in Fairfax, Va.

He said the feature would become even more important as vendors of equipment such as routers and PBXs give their equipment the intelligence to signal for extra bandwidth when the gear nears peak capacity.

According to Adaptive's Giancarlo, the dial-up T-1/T-3 support will enable a user to "build a leased-line network to meet average traffic demands and use switched services to fulfill the peak."

Adaptive designed the switch using separate software modules, which will make it easier to adapt the switch to support emerging Asynchronous Transfer Mode cell relay-based services.

The STM's Network Software, which controls features such as network recovery, trunk management and partitioning networks among groups of users, will be used in the Asynchronous Transfer Mode switch that Adaptive is now developing.

Adaptive declined to detail pricing for the STM but said it would be more cost-effective to install the switch than to buy an IDNX/90 that supports more than three T-3s. ◘

CCITT to probe ISDN compatibility

continued from page 4

head on CCIR and CCITT matters at EUTELSAT in Paris.

While this specification works fine over most terrestrial links, it poses problems with satellite connections because propagation delays slow up acknowledgment notices. In practice, sending devices may need to stop periodically until the acknowledgment can finish its return trip over the satellite hop. As a result, throughput can be reduced by as much as five times, Amadesi said.

This is particularly problematic because packet standards are used as the basis for many ISDN services. For example, Group IV facsimile uses X.25 and X.75 protocols to packetize traffic for transmission over ISDN B channels, according to Sian Oei, a principal engineer at INTELSAT in Washington, D.C. and INTELSAT's representative to CCITT Study Group 18, which sets ISDN standards.

"Suppose someone is using Group IV facsimile and he makes a connection — it just happens to be over a fiber cable — and the transmission takes less than 10 seconds," said John Phiel, manager of communications system engineering at INTELSAT. "Now the next day, he gets a satellite connection and that same transmission takes five times longer."

Phiel said such differences in throughput could cause many users to become dissatisfied with ISDN services and could eventually prompt users and carriers to run ISDN primarily over terrestrial links.

Amadesi, Phiel and Oei said that with some relatively minor changes in existing standards — perhaps increasing the number of packets sent out before requiring an acknowledgment — ISDN throughput over satellite links could equal throughput over terrestrial links. ◘

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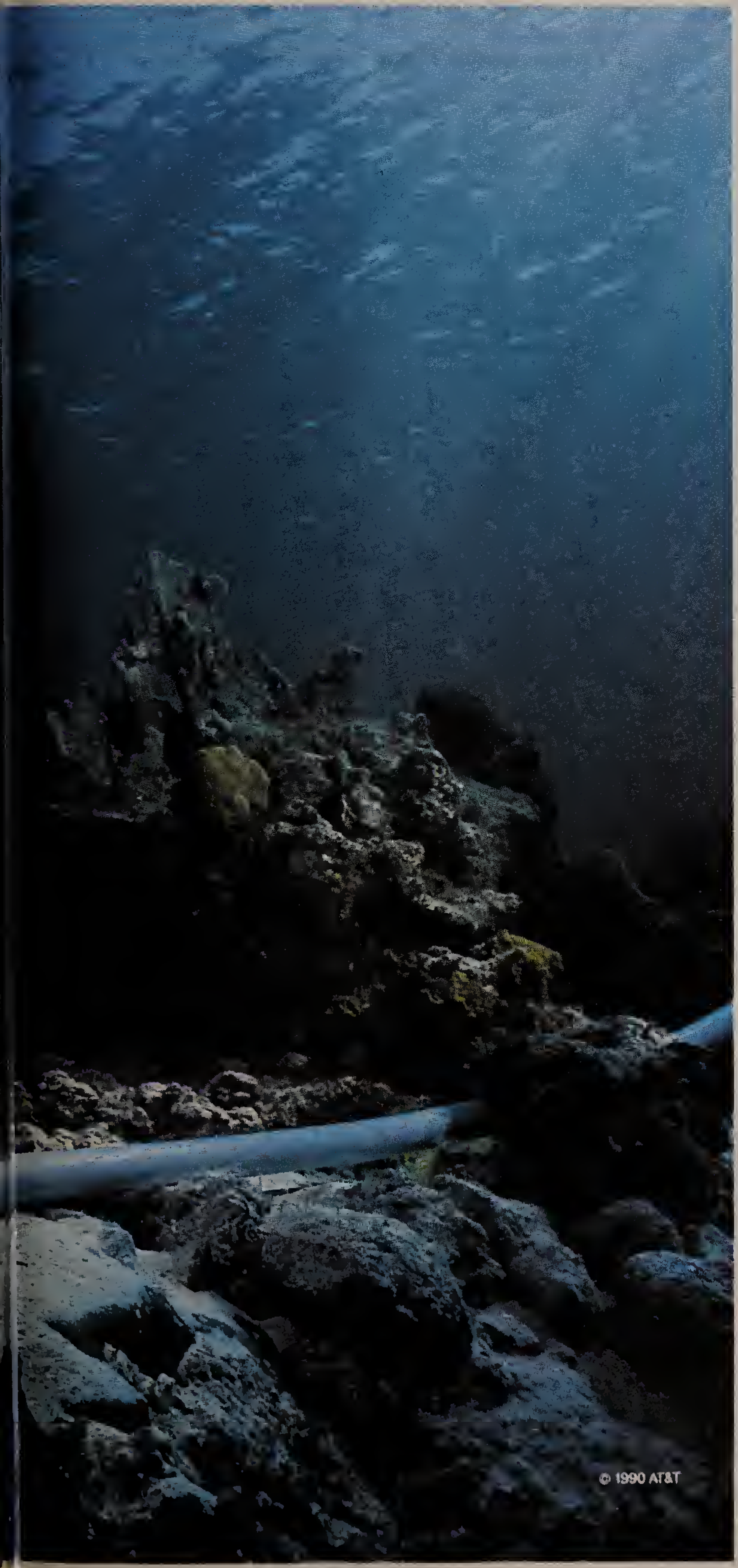

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CCITT readies EDI/X.400

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Equipment Corp. in Europe and another with the Aerospace Industry Association (AIA). With the AIA, it is conducting an EDI/X.400 pilot test to validate the transfer of EDI documents over interconnected X.400-based value-added networks.

Kenneth Murphy, X.400 product manager for GE Information Services, a value-added network provider that already offers a pre-X.435 EDI-over-X.400 service, said vendors may run into some problems making X.435-based products.

One is that X.435 is based on the 1988 version of X.400, yet vendors' existing offerings are largely based on the 1984 version of X.400, Murphy said. He added that, initially, demand for EDI over X.400 will come only from the very largest EDI users, not the many smaller EDI users that are content with existing EDI.

EDI/X.400 Project in test

Members of the Aerospace Industry Association (AIA) are in the early stages of a project involving the exchange of EDI documents between carrier networks using the X.400 messaging protocol.

By using X.400 to support the transmission of electronic data interchange documents, AIA members would be able to route traffic over one carrier's network to trading partners on other public or private nets that also support the messaging protocol ("Aerospace firms mull EDI project," *NW*, Feb. 19).

The primary objective behind the AIA's EDI/X.400 Project is to enable AIA members to swap EDI documents with their U.S. government customers, said Rick Saddic, project leader for the AIA and senior program leader for Westinghouse Electric Corp. in Baltimore.

Government agencies have begun adopting X.400 to comply with the Government Open Systems Interconnection Profile and are increasingly using EDI in anticipation of the Department of Defense's Computer Aided Acquisition and Logistics Support initiative, he said. AIA members also recognize that they could save money by merging electronic mail and EDI onto the same facilities, Saddic said.

"Standards-based EDI over X.400-based products may not come to market for three years, so there was an urgency for an interim solution," he said. The EDI/X.400 Project is an outgrowth of the AIA's efforts to get value-added network (VAN) providers to interconnect their nets using the international X.400 standard, Saddic added.

"X.400 was designed for interpersonal communications, not application-to-application communications like EDI," Saddic said. "I'm not convinced that just because the VANs can support E-mail across an interconnection, they can do the same for EDI."

Saddic said members of the AIA began thinking of the EDI/X.400 Project about a year ago and made their proposal at an AIA meeting during the spring. After getting the go-ahead from the AIA, the group in June invited VANs to participate in a pilot project.

In August, participating AIA members began testing communications between their EDI systems and their primary VANs. Participating AIA members include The Boeing Co., Lockheed Corp., LTV Corp., Martin Marietta Corp., McDonnell Douglas Corp., Pratt & Whitney, Westinghouse Electric and Texas Instruments, Inc.

Participating vendors are AT&T, BT Tymnet, Inc., GE Information Services, Harbinger* EDI Services, Inc., MCI Communications Corp., US Sprint Communications Co. and Western Union Corp.

— Bob Brown

Years of SDN shape industry

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He said the SDN Users Association pushed for the voice mail capability, which AT&T will begin beta-testing by year end.

In fact, users said AT&T's willingness to let SDN customers contribute to — and, in some cases, lead — development of new features is a major factor behind the meteoric rise of SDN in the last few years.

"AT&T did a major turnaround," said Barney Lykens, president of the SDN Users Association and network planning manager for Navistar International Corp.'s information systems services group in Oakbrook Terrace, Ill. "Up until about two years ago, AT&T told us what we wanted on SDN. Then they started listening."

AT&T had little choice, analysts said.

"They were taking a serious beating at the hands of MCI and US Sprint in the virtual network market," according to Jeffrey Close, president of Tri-Quad Enterprises, a consulting and network design firm in Glastonbury, Conn. "Their services didn't have huge setup charges, were generally cheaper than AT&T's and were targeted at more than just the 200 to 300 largest firms."

Starr acknowledged that SDN, launched in November 1985, was initially targeted at 200 to 300 companies with 60- to 100-site Common Control Switching Arrangements, Enhanced Private-Switched Communications Service and ETNs.

But by the end of 1988, AT&T had signed on only about 100 customers, and half of those used the service to augment existing private networks, he said.

When it was first announced, SDN carried a huge $105,000 onetime service establishment charge. "This was a killer mistake," Close said. "This charge kept countless companies away from SDN."

It also initially had only a few features.

According to William Miller, corporate telecommunications director for Control Data Corp., "SDN was almost featureless when it first came out, but it has grown to become a full-featured network service with everything from off-network calling and network remote access to [Software-Defined Data Network] and Global SDN."

Moving from an ETN to SDN reduced CDC's average cost for calls between on-net locations from 38 cents to 15½ cents per minute. "CDC employees now pay 60% less for a long-distance call than they did five years ago," Miller said.

In 1987, AT&T reduced SDN's onetime charge from $105,000 to $60,000, and in late 1988, it filed its first volume discount and term plans. Before this, users bought SDN on a monthly basis.

Now, Miller said, "With SDN, we have a service that is truly user-driven. The SDN Users Association has a tremendous amount of influence over AT&T product management and development — and that's the secret to the success of SDN."

In fact, AT&T acknowledges that it was a CDC staff member who developed the concept of using switched access to expand SDNs to smaller sites. AT&T began offering switched SDN access in late 1988.

CDC also worked with AT&T to develop the concept of a single point of contact at AT&T for all SDN customers. That contact took shape as AT&T's SDN Control Center in Atlanta. No other carrier has a dedicated virtual net control facility.

The 300-company SDN user group worked closely with AT&T to develop such features as online management reports, SDDN and Global SDN, according to Lykens.

In 1989, AT&T announced, among other offerings, a new three-year term plan with higher volume discounts and reduced rates.

It also launched its first major SDN promotion, under which it waived a variety of SDN charges. The promotion helped AT&T nearly quadruple its SDN customer base from 119 to 500 last year, according to a recent Federal Communications Commission report.

Calendar

Nov. 12-14, Atlanta — The 17th Annual Computer Security Conference and National Exhibition. Contact: Computer Security Institute, 500 Howard St., San Francisco, Calif. 94105; (415) 267-7651.

Nov. 12-16, Las Vegas — Comdex/Fall '90. Contact: The Interface Group, 300 First Ave., Needham, Mass. 02194; (617) 449-6600.

Nov. 12-16, San Jose, Calif. — Chris Date on Relational Database. Contact: Codd and Date, Inc., Suite 220, 2099 Gateway Place, San Jose, Calif. 95110; (408) 441-6400.

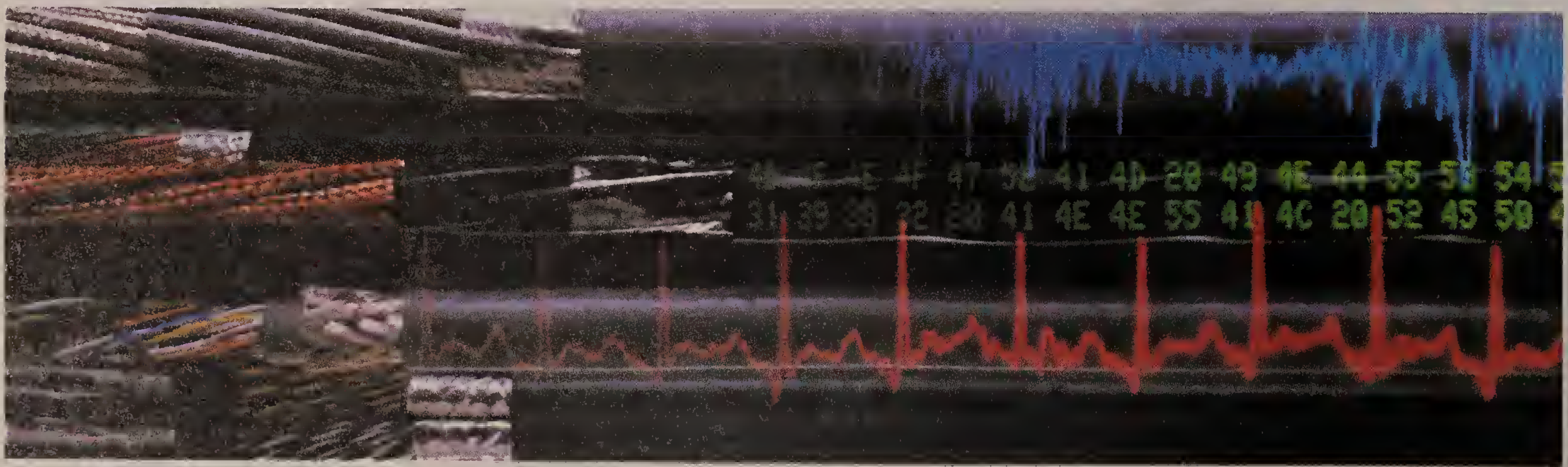
Nov. 13, New York — The Fotec Fiber Optic Seminar: Technology & Applications. Contact: Fotec, Inc., Box 246, 529 Main St., Boston, Mass. 02129; (800) 537-8254.

Nov. 13-14, East Rutherford, N.J. — Cashing in on New Wireless Markets. Contact: Edward Denion, Probe Research, Inc., Suite 240, 3 Wing Drive, Cedar Knolls, N.J. 07927; (201) 285-1500.

Nov. 14-16, Cambridge, Mass. — AppliCASE. Contact: AppliCASE, P.O. Box 72, Mountain Lakes, N.J. 07046; (201) 299-7650.

Nov. 14-16, Amsterdam — Eurofax '90 Conference and Exhibit. Contact: BIS CAP International, P.O. Box 68, Newtonville, Mass. 02160; (617) 893-9130.

Nov. 26-28, Toronto — EIS '90. Contact: Emily Thomas, The EIS Institute, 174 Cabot St., Newton, Mass. 02158; (617) 964-4555.



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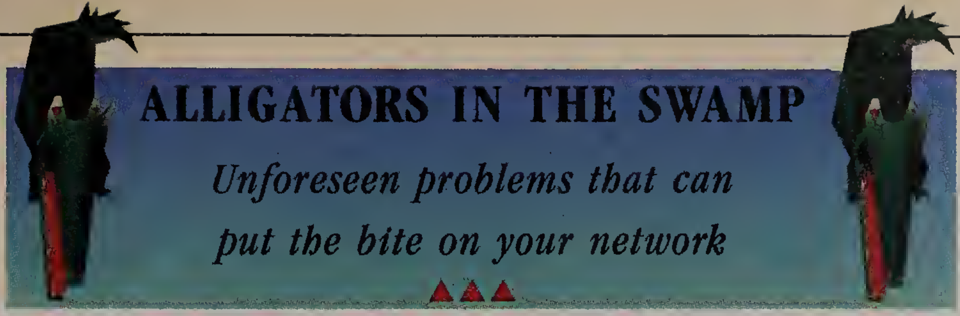


ALLIGATORS IN THE SWAMP

Unforeseen problems that can put the bite on your network

Electricians: a net's nemesis?

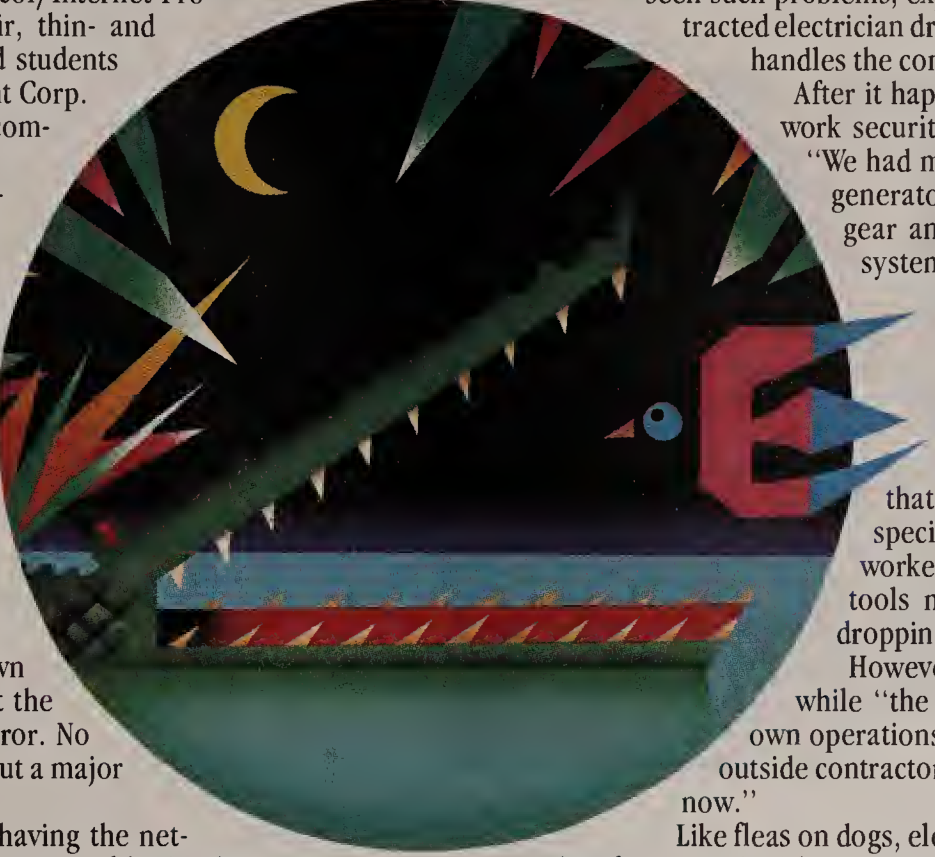
Proper procedures can prevent carelessness from crippling your network.

These days, there's a lot of talk about the higher functional layers of the Open Systems Interconnection model, but the incident I can't forget was caused by interference with the network at the physical layer.

Problems that affect networks are often inadvertently caused by electricians who perform non-network-related jobs. This turned out to be the case when the educational network that my company installed at a university in Ohio began having serious problems. If I had only known electricians had been working there at the time, I'd have gone right to the source of the difficulty.

The university internetwork consisted of several local-area networks running Transmission Control Protocol/Internet Protocol over Ethernet and using twisted-pair, thin- and thick-wire coaxial media. The net provided students and faculty with access to Digital Equipment Corp. VAXclusters and Cray Research, Inc. supercomputers.

My staff was responsible for design, installation and support of the network's hardware and software, but users were allowed to reconfigure their sections of the network. Whenever disaster struck, it was my staff's baby. We had installed the net and were supporting its LAN and TCP/IP portions.



Collision course

One morning, several system administrators called the network help desk to report an unusually large number of Ethernet and TCP/IP packet collisions. We also received reports that servers were going down all over the network. We knew at once that the cause had to be a system administration error. No network we installed could go berserk without a major user reconfiguration.

We began investigating the problem by having the network staff dump the server logs to disk so that we could print them out. Sure enough, an amazing number of errors were recorded. Even more amazing was the fact that the errors disappeared from time to time, then reappeared — and were occurring randomly. However, there was no sign of any system administrator reconfiguration.

Next, we dispatched field technicians to the site to locate the source of the problem. They couldn't find it. Our usual procedure was to run network diagnostics after isolating sections of the cable plant. Again, the errors were occurring sometimes, then clearing up.

The technicians isolated servers, removed routers and bridges, checked for streaming cards and performed all the right tests. There was no apparent cause for the errors. The technicians next hooked up a Hewlett-Packard Co. HP 4972A LAN analyzer and set filters and traps. They then loaded the system by generating maximum traffic — with no problem. The network logs were perfect. I was totally stumped.

The help desk told the system administrator to save all logs and call as soon as the problem recurred. All we could think of at that point was to dial in with remote diagnostics and see if we could catch the problem as it occurred.

One night, as I continued to wrestle with this problem, I sought temporary relief in a hot tub at the university dean's house nearby. As we relaxed, the dean mentioned that he had just discovered that new electrical wiring ducts had recently been installed in the building in which the troubled network was located. It dawned on me that this had to be the root of our network problem: The electricians who had done the work — which the dean hadn't authorized — must have run the ducts parallel to the LAN and data terminal cables. In a traditional computer environment, the power wiring runs perpendicular to the communications wiring.

My hypothesis was correct. Whenever the electricians put power through the wires to check connections, current flows were induced in the parallel cables, causing the network errors we had observed. When the electricians dropped the power, net performance came back up. By simply instructing the electricians to reposition the ducts, our network problem was solved.

Other examples

Often, net managers can prevent electrician-induced network problems by implementing electrical security procedures and ensuring that they are followed to the letter — by both company personnel and outside contractors.

A major electric utility company, which perhaps should have foreseen such problems, experienced a network crash when a contracted electrician dropped a wrench into the switch gear that handles the company's power and backup power.

After it happened, I met the utility company's network security manager, who told me the sad tale. "We had millions of dollars in two sets of backup generators, fully duplicated electrical switch gear and even two complete air conditioning systems — and a dropped wrench took it down hard," he said.

Ironically, the firm has a company safety manual, which all employees are required to read and sign, that contains a section pertaining to working on circuits. The manual clearly states that when working on or near live circuits, special tools must be used to protect both the worker and the power grid, and that these tools must be cabled to prevent them from dropping.

However, as the firm's net manager notes, while "the company takes exceptional care in its own operations to avoid mistakes, no one insisted the outside contractors follow the same precautions. They do now."

Like fleas on dogs, electricians are always going to be a problem for networks. The answers are procedural rather than technical.

First, make sure that no "hot work," work capable of causing a fire or spark, is done without proper authorization. A hot work permit system should be in place and followed in every location. In addition, hot work permits should be approved by the network manager. Whenever possible, schedule work during off-peak hours so that if something goes wrong, it will have less impact on the network.

When your staff reviews hot work permits, they should also decide which tasks require a network monitor. This doesn't have to be an electrician but someone who knows about safety procedures. This person is the one who makes sure all disconnected circuits are properly locked out and reenergized, and that switches are reset and covers replaced.

Electricians have been known to switch phasing on three-phase motors by changing the sequence in which the wires for each phase are connected. This can change the rotation direction of the three-phase motor and make a disk drive attempt to run in reverse. Make sure to check the phase sequence before restarting.

Educate the building managers. Explain the risks that electrical problems present to the network. Insist that all workers — both contract and staff — follow the clearance procedures and that disciplinary actions are taken against those who don't.

Electrical problems that are not predictable or preventable happen often enough. Those caused by poor procedures can easily be avoided with the right controls and a wary eye on electricians. And when the problem seems unsolvable, go find a hot tub! ◼

Hertzoff is president of Tholian (Holdings) Inc., a Columbus, Ohio, network management and security consulting firm.

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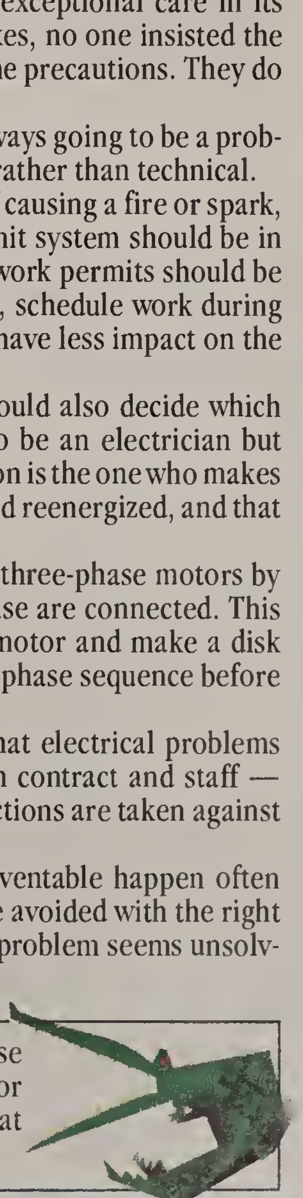

By IRA HERTZOFF

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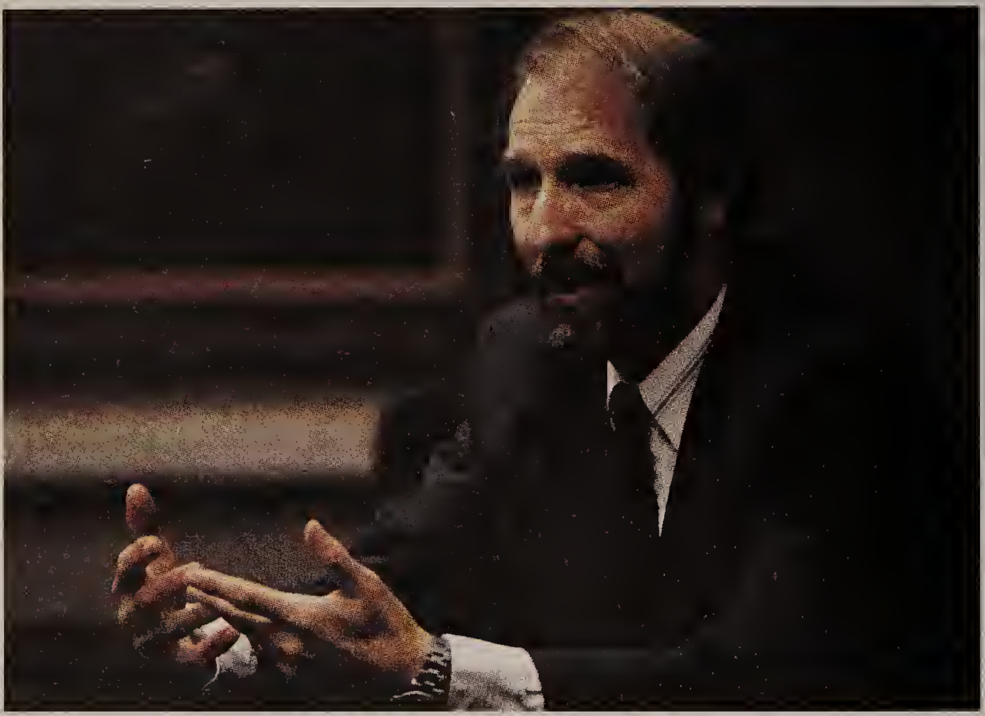

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